# DIE CASTINGS

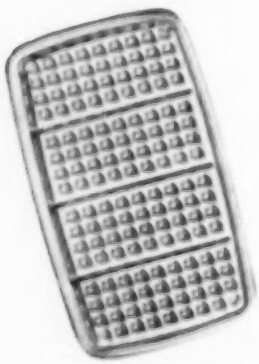
INCLUDING A SPECIAL FINISHING SECTION

June, 1950

THE PRODUCT DESIGN MAGAZINE FOR USERS AND POTENTIAL USERS OF DIE CASTINGS

# Be sure you specify...

# VELVAGLAZE



## MONARCH'S *ORIGINAL* PROCESS FOR PRODUCING BRIGHTER, SMOOTHER, MORE DURABLE CASTINGS

Monarcastings produced by the exclusive, new **VELVAGLAZE** process uncover rich, new fields of opportunity for design and product engineers.

You can specify **VELVAGLAZE** where ordinary commercial castings offered problems in cost of finishing, performance or sales appeal. Exposure to the elements, submersion in soap and detergents, normal reactions to cooking and broiling have little effect on **VELVAGLAZE** processed castings. They stay shiny-bright and velvety-smooth. You find no sharp edges, burrs or rough spots, and **VELVAGLAZE** hard, dense surfaces resist scratching, scuffing and other abrasive actions.

***FOR A PERSONAL DISCUSSION OF VELVAGLAZE IN RELATION TO YOUR OWN PRODUCT, CONTACT THE MONARCH-MAN IN YOUR TERRITORY***

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Cleveland, Ohio, Olympic 1-1700

**WRITE TODAY FOR NEW INTERESTING FOLDER**

A useful, non-technical, ready-reference folder for product engineers, designers and merchandising executives who want sales appeal in their products.

**MONARCH ALUMINUM MFG. COMPANY** • Detroit Avenue at West 93rd Street, Cleveland 2, Ohio

# Specialists in ZINC BASE DIE CASTING ALLOYS

Zinc base die casting alloys, produced by H. Cohn & Sons, Inc., are specially designed to meet the rigid requirements established by the die casting industry.

Modern *thermostatically controlled* production equipment combined with carefully selected materials and strict laboratory control assure uniformly high quality alloys—alloys that comply with ASTM and SAE specifications.

Consult with H. Cohn & Sons, Inc., on your zinc base alloy needs. We shall welcome the opportunity of working with you. Write or wire.

**H. COHN & SONS inc.**

4528 WEST DIVISION STREET • CHICAGO 51 • ILLINOIS

H C & S H C & S

**JUNE 1950**
**Vol. 8 No. 6**

# DIE CASTINGS

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ABC ABP

COVER—The usefulness of the Toddlers' Toidey is greatly increased by its versatility. Only by the use of a die cast base has it been possible to make the Toidey adaptable to the needs of the growing child until he ceases to need special individual equipment. Article on page 24.

## CONTENTS

Literature and Services Offered in Ads ..... 4
Letters to the Editor ..... 6
Speaking of Light Weight ..... 21
Die Cast Base Increases Versatility ..... 24
Plated Die Cast Tubes Solve Special Problems ..... 29
The Perfect Set-Up ..... 32
Die Cast vs. Stamped Stove Trim ..... 34
Five Product Design Case Histories ..... 36
News of the Industry ..... 61
Opportunities ..... 63
Current Review ..... 65

## FINISHING SECTION

Production Clinic ..... 45
Chemical treatment of die castings contributes to high quality organic finishes.
Tapping Increased From 20 to 125 Parts Per Hour with Multiple Spindle Head ..... 49
New Products ..... 50
Manufacturers' Literature ..... 56

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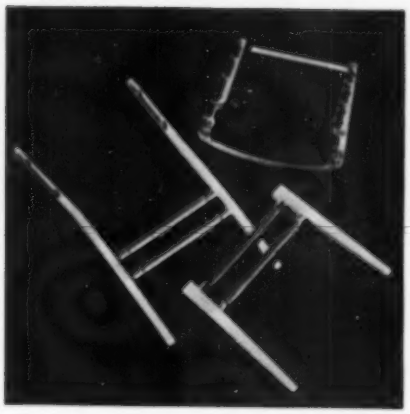
Acceptance under Section 34.64 P. L. & R. authorized.

# MAGNESIUM
# DIE CASTINGS

## A proved material—competitively priced

Hundreds of successful applications have proved magnesium a sound, useful die casting material with many advantages. It's economical, too. You don't have to pay a premium price to put these advantages to work improving your product. *Magnesium die castings are priced competitively with those in other materials,* and in some cases they are cheaper.



difficult castings?

## *Dow can make them in Magnesium!*

These die castings for a folding chair presented many problems. Lightness was essential, so thin sections were required. The design made complicated coring and gating necessary and the long flow of metal required special casting techniques. Dow die casting specialists solved these problems, and as cast in magnesium, the *finished castings weighed less than the wood parts they replaced.* In addition four magnesium die castings replaced fourteen different wood parts; a fabrication saving well worth while.

Magnesium has many advantages as a die casting material. Its freedom from soldering to the die and unsurpassed dimensional stability simplify difficult casting problems. But whether your casting requirements are complex or simple, you'll be surprised at the low cost of magnesium die castings. If you have a die casting application, call your nearest Dow sales office, or write Dept. MG-13 in Midland.

*Magnesium Division*

**THE DOW CHEMICAL COMPANY**

MIDLAND, MICHIGAN

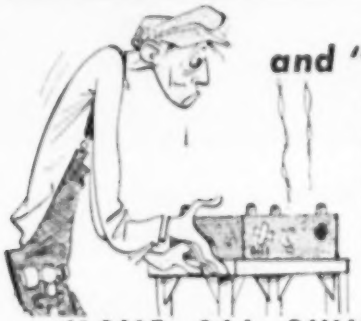
New York • Boston • Philadelphia • Washington • Atlanta
Cleveland • Detroit • Chicago • St. Louis • Houston
San Francisco • Los Angeles • Seattle
Dow Chemical of Canada, Limited, Toronto, Canada

## "MUSCLES"

Muscles used to think a crowbar was standard equipment for removing stuck castings. But after he tried Die Slick he found out: (1) a can of Die Slick is cheaper than a good crowbar, (2) with Die Slick, castings are lifted out, not pried out, (3) he looked pretty silly on the flying end of a crowbar, (4) he didn't need a crowbar at all!

## "ALBERT"

The air is fresh and clean around his machine now that Al-Chemist Albert has junked his 86,000 homemade die lubricant formulas that all lacked something—and standardized on the die lubricant that has everything". They call him "Speedball" now that he has quit expensive experimenting and begun batting out Die Slick-lubricated castings!



## and "CUTHBERT"

The boss said,—"For the 10,010th time try this" on those expensive dies." And finally Death-On-Dies Cuthbert did.—Now the money saved by eliminating Cuthbert's downtime has the stock room filled with enough cans of all **five** grades of Die Slick to last for months to come!

## ...HAVE ALL SWITCHED TO...

# * DIE SLICK

They all agree. Die Slick is right for every job: definitely prevents sticking even on complicated dies, is non-staining, is easy to use, and most important, is truly economical. 78% of all die casters use Die Slick. **Write for a trial supply** to use on your most difficult job (please specify whether for zinc, aluminum, magnesium, or brass). We'll cancel the invoice if you're not completely satisfied.

**G. W. SMITH & SONS, INC.**
5403 Kemp Road, Dayton 3, Ohio


## LITERATURE AND SERVICES OFFERED IN THIS MONTH'S ADS

NOTE: Circle numbers on the enclosed postcard to indicate literature, samples or trial services you wish to receive.

A-1. LITEMETAL DICAST, INC. New uses for aluminum and magnesium die castings are described in literature giving design case histories.

A-2. PARKER WHITE-METAL CO. The company offers a book on its facilities in the aluminum and zinc die casting fields.

A-3. PANGBORN CO. A die casting die cleaner that increases runs between cleaning periods and eliminates cold shots is described by the company in Bulletin 1400A that explains its Hydro-Finish die cleaner and its uses.

A-4. DETROIT POWER SCREWDRIVER CO. Illustrations and descriptions of timesaving aids including power screwdrivers, fixtures, nut drivers and hopper units are listed in a catalog offered by the company to help solve production screwdriving problems.

A-5. DOW CHEMICAL CO. How quality magnesium die castings can be obtained at competitive prices by using Dow production facilities is explained in literature offered by the company.

A-6. HELI-COIL CORP. How to simplify design and effect economies in die castings by using the company's screw thread inserts is explained in Bulletin No. 248 that contains design, specification and installation data.

A-7. PARKER-KALON CO. How to cut assembly costs and time by using Parker-Kalon fastening devices, including self-tapping screws, on die castings is explained in a new folder, Form 649.

A-8. FEDERATED METALS DIVISION, AMERICAN SMELTING AND REFINING CO. Information is offered on a new aluminum die casting alloy, F-4110, that is claimed to be superior to standard aluminum alloys.

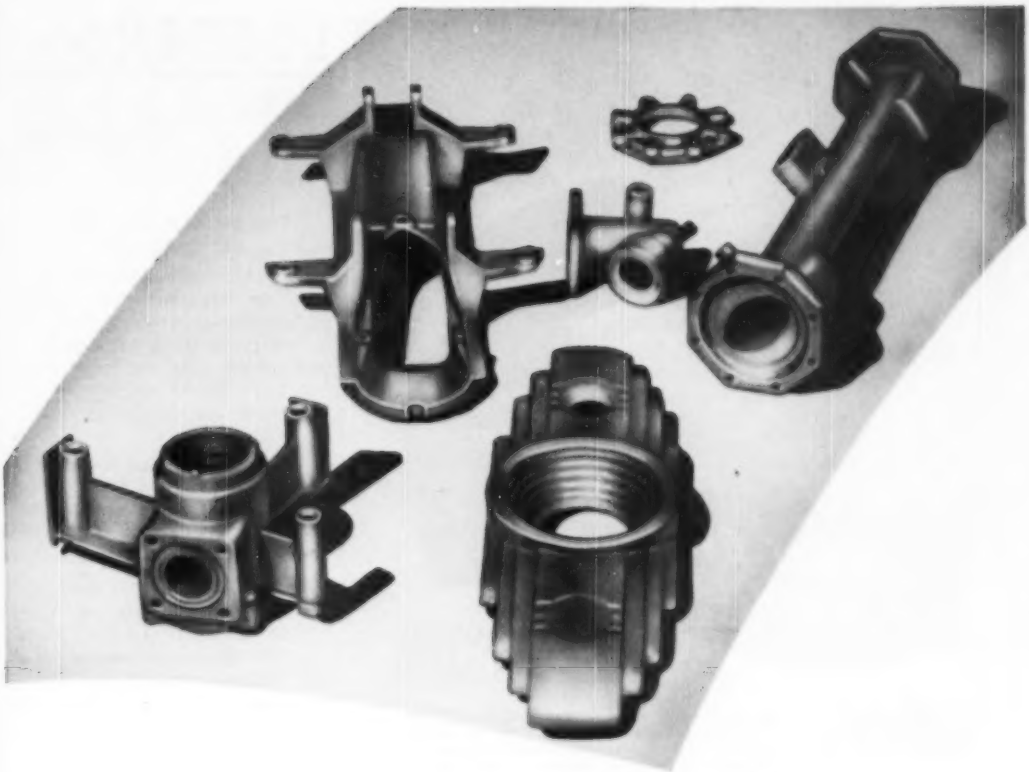
A-9. OAKITE PRODUCTS, INC. "Some good things to know about metal cleaning" is the title of a free booklet offered by the company. It contains information on the fastest and most economical ways to clean metals. The book is illustrated and contains 44 pages.

A-10. WAGNER BROS., INC. The company offers a bulletin on the use of Vander Wal Wagner Applimatics, which apply buffing compounds automatically and in correct amount so as to reduce wear on buffs and save compound.

A-11. G. W. SMITH & SONS, INC. Samples of Die Slick, die lubricant that is said to prevent sticking on even complicated dies, are offered by the company.

A-12. ACROMARK COMPANY. Literature is presented on hand and motor driven models of the Acroprinter, a machine for filling recessed letters and designs on die cast parts with enamel.

(Continued on Page 8)



## The Results of a Recent Meeting!

Recently a leading gasoline pump manufacturer came to Parker with an intricate part problem. Our engineers consulted with him and together worked out the correct design and best material alloy for the job. An economical production run was set up at a worthwhile unit saving.

Shown above are the six Parker die cast parts for one assembly.

It pays to consult with Parker early in the development of die cast parts.

Write for our book on Parker facilities. Send us your blueprints.

PARKER WHITE-METAL CO. • 2144 McKINLEY AVENUE • ERIE, PENNSYLVANIA

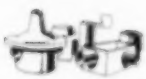
R. T. BLOOMQUIST, Bellefonte, Penna. . . . O. J. BERGER, Room 1413, 139 N. Clark Street, Chicago 2, Ill. . . . O. H. BROXTERMAN, 1409 Elm Street, Cincinnati, Ohio . . . T. W. JOHNSON, Hillside Road, 7 Hills Village, Cleveland, Ohio . . . VAN ARSDELL & HODGSON, 208 Machinery Bldg., Detroit 11, Mich. . . . G. L. PALMER, 97 Spring St., Metuchen, N. J. . . . J. C. PALMER, 3577 Monroe Ave., Pittsford, N. Y. . . . H. R. LAMONTAGNE, P. O. Box 969, Springfield, Mass. . . . EDWARD F. HIGGINS, Jr., 4931 Lucinda Avenue, St. Louis, Missouri.

# PARKER ALUMINUM and ZINC Die Castings

about buying
DIE CASTINGS

SERVICE—Your die casting supplier must have the facilities for prompt shipment of finished castings, combined with a service organization to give you immediate consultation on design or production problems.

QUALITY—Your die casting supplier must have complete quality control from raw ingot to finished product to assure "on grade" castings at all times.



FLEXIBILITY—Your die casting supplier must have the ability to produce every type and size of casting in either zinc or aluminum alloys.

ECONOMY—Your die casting supplier must have the engineering experience and production know-how to produce quality die castings at the least possible cost.

Here at Newton-New Haven we have all of these. Are you getting the most from your present arrangement? You must make a comparison before you can know. Ask the Newton-New Haven representative nearest you or write us.

*For more than 10 Years QUALITY has been synonymous with*

NEWTON NEW HAVEN

THE NEWTON-NEW HAVEN COMPANY
689 THIRD AVENUE
WEST HAVEN 16, CONNECTICUT

# LETTERS TO THE Editor

## TRIMMING FLASH FROM DIE CASTINGS

As subscribers to your magazine, we are interested in and have received a great deal of benefit from many articles that you publish. To my knowledge you have never had an article published on trimming flash from die castings.

I am certainly interested in knowing if you have anything in your files pertaining to the removal of flash from die castings.—G. C. H.

*In our March, 1948, issue we carried a complete discussion of "Flash Removal As It Affects Die Casting Design" and at various times we have had articles on finishing processes such as broaching, tumbling, etc., which include pointers on flash removal. Tear sheets have been forwarded.—Ed.*

## BRASS DIE CASTING SOURCE

We are looking for a source for brass die castings in or near Chicago and would appreciate being given the names of such manufacturers. The article on Page 20 of your April issue shows some brass die castings but does not give the name of the manufacturer.—J. M.

*Information forwarded.—Ed.*

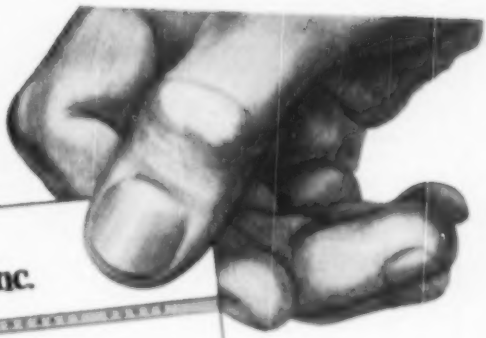
## PLATING ZINC ALLOY DIE CASTINGS

I would like to know to whom I should write to receive the book, "The Plating of Zinc Alloy Die Castings," described on page 46 of the March, 1949, issue of "Die Castings."

Also, if you know of any other books which might be helpful

*(Continued on Page 8)*

# TO BUYERS OF CASTINGS IN ALL INDUSTRIES



Thompson Products, Inc.

WHERE AN ACHIEVEMENT AND A RECORD EXIST

2196 CLARKWOOD ROAD CLEVELAND 3, OHIO

## ALUMINUM DIE CASTING AND PERMANENT MOLD PRODUCTION FACILITIES

NOW AFTER 25 YEARS EXPERIENCE in foundry practice, Thompson Products, Inc., one of the country's leading manufacturers of precision aircraft and automotive parts, offers all industries the most modern and complete production facilities for aluminum die castings and aluminum permanent mold castings.

**Here are Thompson's "helps" for your casting problems:**

- *Completely integrated engineering staff to assure sound, economical die cast or permanent mold designs.*
- *Modern laboratory for metallurgical, physical or chemical analysis and control.*
- *The latest in tool and die shop equipment for the construction of die casting and permanent mold dies.*
- *A production machine shop to handle every machining operation on your castings.*
- *A complete surface finishing department for anodizing as well as plating in chrome, copper and tin.*
- *A Government approved Class 1 completely mechanized permanent mold foundry.*

Thompson Products, Inc., as a manufacturing organization with 11,000 employees, knows and understands your production problems. They have the engineering and production talent to help you. A Thompson sales engineer will welcome the opportunity to work on your casting problems. Direct inquiries to the Light Metals Division.

FACTORIES IN CLEVELAND, OHIO • DETROIT, MICH. • LOS ANGELES, CALIF.

**Thompson Products, Inc.**

2196 ASHLAND ROAD • • • CLEVELAND 3, OHIO

LIGHT METALS DIVISION

DEPENDABLE
BETTER METHODS
SUPER CAST DIE CASTINGS
BETTER DIE CASTINGS
SINCE 1919

**The meaning of a signature!**

Through a quarter of a century of knowing how, the SUPER CAST reputation for Better Methods – Better Die Castings, has been recognized.

Sound engineering, metallurgical knowledge and skilled techniques have achieved and maintained a standard of superior quality.

SUPER CAST has kept faith, always deserving the mark it bears. SUPER CAST means die castings for those who want the best.

A sound, time-tested institution and a sound time-tested product have won confidence and widespread endorsement.

DEPENDABLE
BETTER METHODS
SUPER CAST DIE CASTINGS
BETTER DIE CASTINGS
SINCE 1919

**THE SUPERIOR DIE CASTING COMPANY**

1001 London Road CLEVELAND 10, OHIO

Detroit Chicago Pittsburgh

## LETTERS TO THE EDITOR

*(Continued from Page 6)*

on this subject I would appreciate hearing from you.—J. L. F.

*"The Plating of Zinc Alloy Die Castings," can be obtained from the Zinc Alloy Die Casters Association, Lincoln House, Turl Street, Oxford, England.*

*We have also forwarded reprints of articles we have had on this subject and a list of additional sources for information.—Ed.*

## LITERATURE AND SERVICES

*(Continued from Page 4)*

A-13 COWLES CHEMICAL CO. Two companion cleaners, SO Cleaner and ZN Cleaner, for removal of buffing compounds from die castings are described in a folder offered by Cowles. The folder is "Buffing Compound Removal Was a Tough Job."

A-14 UNITED CHROMIUM CO. Literature is offered on how to give die castings corrosion resistance and chromium-like appearance by a dip process.

A-15 R. LAVIN & SONS, INC. Literature concerning zinc, aluminum and brass die casting alloys is available.

A-16 MONARCH ALUMINUM MANUFACTURING CO. A non-technical folder is offered to product engineers, designers and merchandising executives to help put more sales appeal in products made by die, sand or permanent mold casting.

A-17 ALLIED RESEARCH PRODUCTS, INC. The company offers samples and free processing of parts with a new aluminum finish, Iridite Al-Coat, that offers a durable, non-porous film for aluminum products with a single cold process dip.

A-18 BELLOWS CO. Fote Facts File 46-396 contains factual stories showing how the company's "Controlled Air Power" devices can help cut costs on secondary operations on die cast parts.

A-19 NEILSON CHEMICAL CO. A simple phosphate coating, Prep-n-Cote, for preparing steel and aluminum surfaces before painting for greater corrosion resistance is described in Bulletin 48-91 offered by the company.

A-20 GRIES REPRODUCER CO. Besides offering bulletins on its production facilities in the field of small zinc alloy die castings, Gries Reproducer offers samples of its work. This company specializes in the production of tiny die castings.

# NEED ALUMINUM DIE CASTINGS?

## Alcoa's 2 modern plants

(GARWOOD, N. J. • CHICAGO, ILL.)

## make the best you can buy

## for example . . .

This manufacturer of metal furniture specified *Alcoa Aluminum* die-cast chair bases. Aluminum for light weight and lustrous appearance. Die cast for combined strength and rigidity . . . and lowest metal fabricating cost. *Alcoa*, because Alcoa's 35 years in the die casting business and 62 years of aluminum experience mean on-grade castings and dependability.

For a prompt quotation, call your local Alcoa sales office, or write: ALUMINUM COMPANY OF AMERICA, 1895F Gulf Bldg., Pittsburgh 19, Pa.

# ALCOA DIE CASTINGS

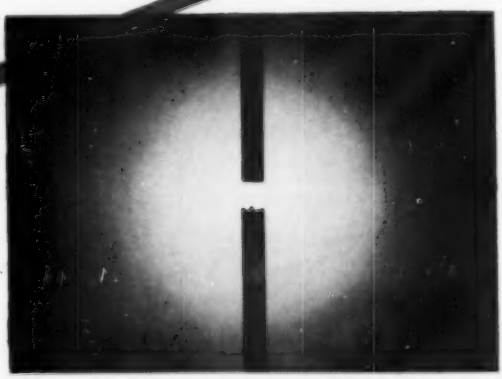
ALCOA ALUMINUM

INGOT • SHEET & PLATE • SHAPES, ROLLED & EXTRUDED • WIRE • ROD • BAR • TUBING • PIPE • SAND, DIE & PERMANENT MOLD CASTINGS • FORGINGS • IMPACT EXTRUSIONS
ELECTRICAL CONDUCTORS • SCREW MACHINE PRODUCTS • FABRICATED PRODUCTS • FASTENERS • FOIL • ALUMINUM PIGMENTS • MAGNESIUM PRODUCTS

# *The* AMERICAN DIE CASTING INSTITUTE

is to be congratulated for providing industry with a metallurgical yardstick in the form of a voluntary control system based on spectrography which assures consumers of the purity and hence, the superior physical properties inherent in die castings made of 99.99+% zinc. With such assurance manufacturers can make still greater use of the products of this comparatively young and vigorous industry whose phenomenal growth in recent years has made it the second largest consumer of zinc.

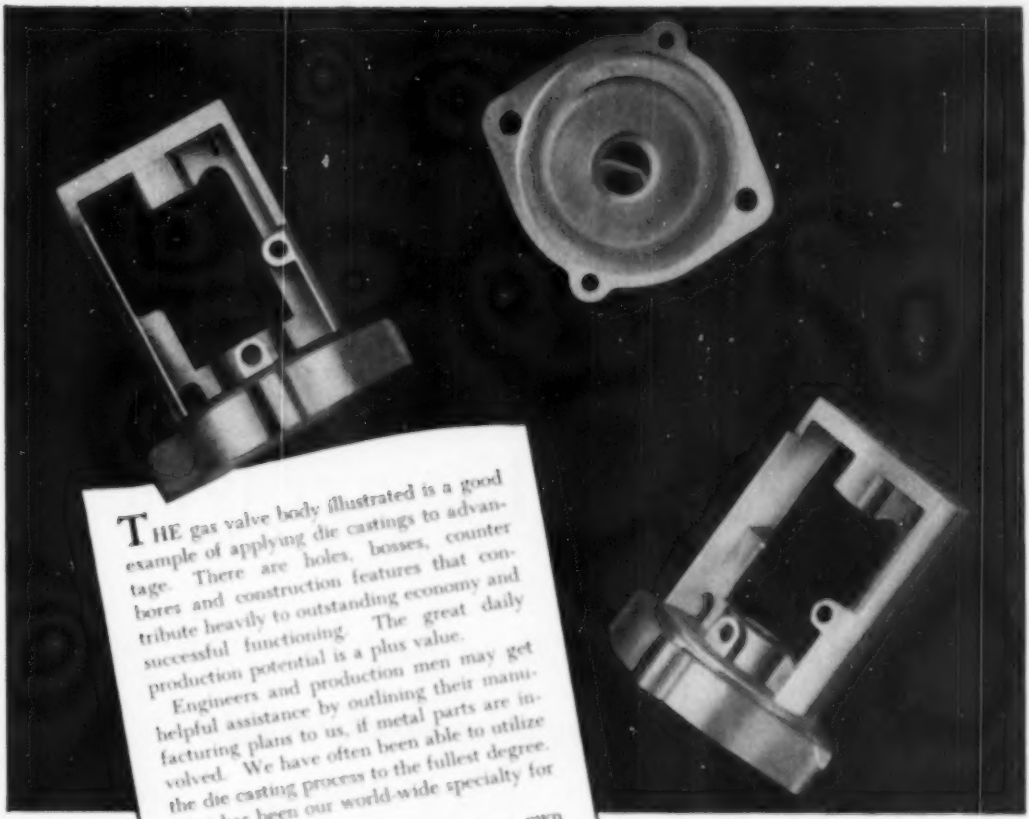
**ST. JOSEPH LEAD COMPANY**
**250 Park Avenue · New York 17, N. Y.**



A spectrograph is basically a picture of a spark. All elements, when "excited" by heat or electrical discharge, emit radiations of known wave lengths. In spectrography, this light is dispersed into its component parts (the spectrum) and recorded on a photographic plate. The wave lengths are always the same regardless of what other elements are present in the substance under investigation, and since these wave lengths are accurately known it is possible to identify each line in the spectrum and thus gain a complete knowledge of the composition of the metal. The density of the spectral line bears a direct relation to the amount of the element present, therefore the spectrograph also provides a basis for quantitative analyses.

**BUNKER HILL 99.99+% ZINC**

# PRODUCTION PLANNING IS OFTEN SIMPLIFIED WITH MADISON-KIPP ZINC AND ALUMINUM DIE CASTINGS



THE gas valve body illustrated is a good example of applying die castings to advantage. There are holes, bosses, counter bores and construction features that contribute heavily to outstanding economy and successful functioning. The great daily production potential is a plus value.

Engineers and production men may get helpful assistance by outlining their manufacturing plans to us, if metal parts are involved. We have often been able to utilize the die casting process to the fullest degree. That has been our world-wide specialty for many years.

It may pay you to canvass your own situation on parts and to write us at our home office in Madison, Wisconsin.

## MADISON-KIPP CORPORATION

213 WAUBESA STREET, MADISON 10, WIS., U.S.A.

ANCIENS ATELIERS GASQUY 31 Rue du Marais, Bruxelles, Belgium, sole agents for Belgium, Holland, France, and Switzerland.

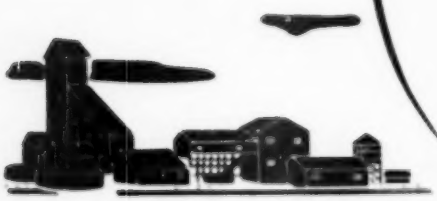
WM. COULTHARD & CO. Ltd., Carlisle, England, sole agents for England, most European countries, India, Australia, and New Zealand.

- *Skilled in* DIE CASTING *Mechanics*
- *Experienced in* LUBRICATION *Engineering*
- *Originators of Really High Speed* AIR TOOLS

# 99.99+% slab zinc

## American Electrolytic

a reliable source for die casting requirements



AMERICAN ZINC SALES CO., Distributors

for AMERICAN ZINC, LEAD & SMELTING CO.

COLUMBUS, OHIO

CHICAGO

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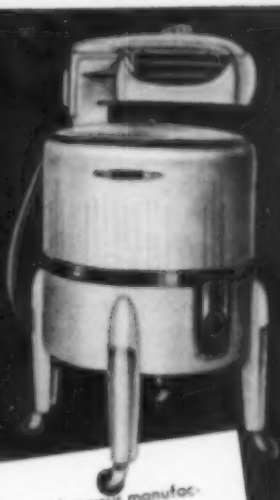
NEW YORK

# DIE CASTING

## cleans up a load of production problems



CASE HISTORIES FROM MT. VERNON FILES

. . . gets rid of the high-cost and waste factors that so often appear unavoidable when you're deciding how to manufacture a competitively selling product.

For die casting **provides fast output** — because pieces are produced almost instantly, as the die closes; **saves material** — because thin-wall sections are obtainable without sacrifice of strength; **simplifies manufacture** — because intricate shapes and structural details can be produced in a single operation.

For example, this gear train housing, with several bushing inserts, and wringer gear case covers of the Universal Washing Machine are produced rapidly by Mount Vernon — so accurately that need for machining is eliminated; so clean that the white enamel finish can be applied directly.

Take a lesson from Landers, Frary & Clark — makers of the famous Universal household appliance line — and profit by giving die casting full consideration before freezing your manufacturing procedure. Here at Mount Vernon our wealth of experience, specialized knowledge and modern facilities have washed the dark spots out of many a production picture . . . shown many manufacturers the way to lower costs, increased output and improved products. May we show you?

**MT. VERNON**
**DIE CASTING CORP.**
MT VERNON NEW YORK

# DIE CASTINGS

## BY

# Stewart

## 40 YEARS OF SERVICE TO INDUSTRY

### DESIGNING

Die Casting Die Designing is an art requiring an extensive knowledge of metals, metal-working techniques, engineering skill, and wide experience. Our designers are craftsmen with many years' direct contact experience in application and end use requirements.

### Services available to you at Stewart's

- Designing
- Die Making
- Engineering
- Metallurgical Control
- Most modern Die Casting Equipment
- Complete machining, polishing and assembly facilities

*We invite inquiries concerning all Die Casting problems.*

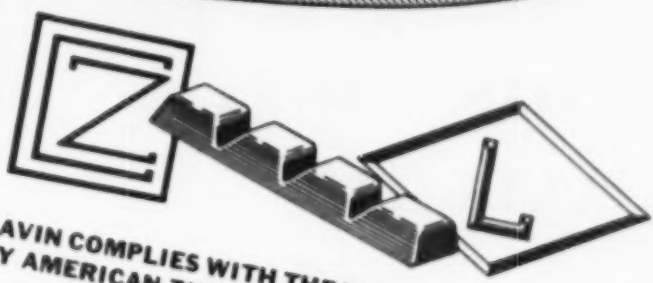
**STEWART DIE CASTING**
Division of Stewart-Warner Corporation

4555 Fullerton Avenue, Chicago 39, Illinois
30 Austin Street, Bridgeport, Connecticut

*We take pride in being known by the customers we keep*

# Zinc Die Casters AGREE ON THESE...

# SEALS of Quality



**LAVIN COMPLIES WITH THE HIGH STANDARDS SET BY AMERICAN ZINC DIE CASTING INSTITUTE...**

Producers of Zinc Die Castings who subscribe to the "Certified Zinc Alloy Plan" may identify their castings with the Certification Seal

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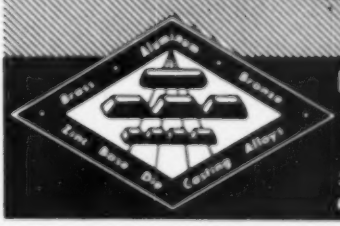


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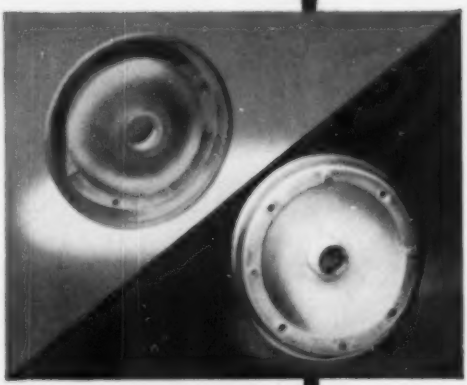
# FORMABILITY!

## ZINC DIE CASTINGS ARE EASILY SPUN OR OTHERWISE FORMED AFTER CASTING

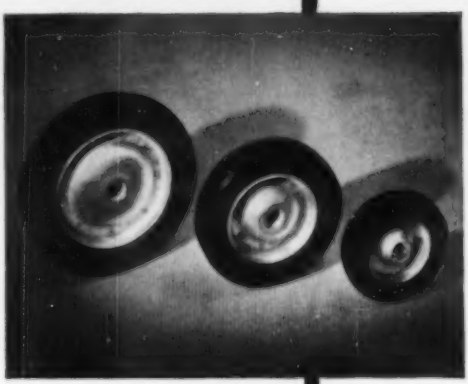
### SPUN STUDS PERMIT RAPID ASSEMBLY

Thanks to the ductility of ZINC die castings, the two identical castings at the right are assembled easily to form a complete hub for a new type lawn mower wheel. Each casting has four integral studs and four holes. Assembly is completed by merely inserting the projecting studs on each casting through the holes on the other, and spinning the counter-sunk stud ends with an ordinary spinning tool. Abuse tests have proved that the spun stud type of construction provides an indestructible bond between the mating castings.



### FOR WHEELS OF UNUSUAL STRENGTH

The above means of assembly was employed for each of the three sizes of rubber tired wheels pictured here. Although the average wall thickness of the die cast hub halves is only .05", the J. G. Doyle Engineering Company has produced wheels of unusual strength. Designed primarily for use on lawn mowers, the sturdy construction achieved — at low cost — by the use of ZINC die castings, should make these wheels applicable for such other heavy duty applications as wheelbarrows, dollies, etc.



The ability to perform spinning, heading, swaging, bending and forming operations on ZINC die castings is only part of the story of why ZINC is the most widely used die casting metal. Every die casting company is equipped to make ZINC die castings and will be glad to discuss their advantages with you. Or write to us.

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The Research was done, the Alloys were developed, and most Die Castings are based on

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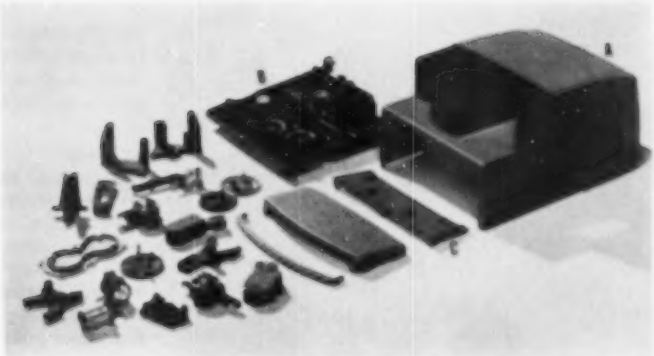
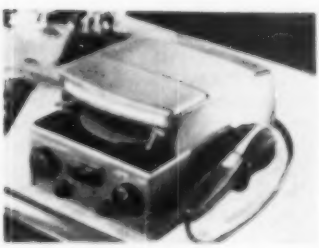


Figure 1. Nineteen component parts of die cast magnesium give lightness and compactness to the Soundscriber dictating machine without sacrificing reliability or durability. The parts weigh a total of only 3 pounds and 10 ounces when cast in magnesium. Included among parts shown above are the main housing, A; the main frame, B; and front panel, C.

# Speaking of Light Weight . . .



By GEORGE KENDE
Production Manager
The Soundscriber Corporation

LIGHT weight and compactness are important features of modern electronic dictation equipment. The extensive use of magnesium die castings enables the Soundscriber Corp. to produce the "Tycoon," an extremely light and compact dictation instrument.

The major factors that differentiate dictating machines from ordinary recording machines are convenience and compactness. Convenience is at a premium in the business office and inconveniences which might be tolerated in home recording or technically operated equipment are not tolerated by business men using dictating equipment. In addition to this, space is usually at a premium in the business office and a compact piece of equipment is necessary.

The modern dictating machine, utilizing a plastic record and electronic principles, has received much broader acceptance for much broader fields than its predecessor, the wax cylinder machine. The easy handling of the plastic record and the easy mailing, particularly of the smaller sizes, makes many new uses for dictation. It is no longer a struggle for the business executive to pick his machine off the desk and take it home. Records can be stored in one's pocket, or can be easily mailed from a remote point. Salesmen can send in reports directly on discs or dictate letters from a remote point to be transcribed at the home office.

With these new features, portability of the equipment becomes very important. Furthermore, since reliability is paramount in any kind of office equipment it is necessary that the equipment be substantial and durable.

### Use 19 Magnesium Die Cast Components

In the endeavor to obtain these objectives, magnesium die castings were used wherever possible. However, specific design considerations required the use of zinc or aluminum die castings on a few parts.

Figure 1 shows the magnesium die castings used on the Tycoon recorder. The 19 mag-

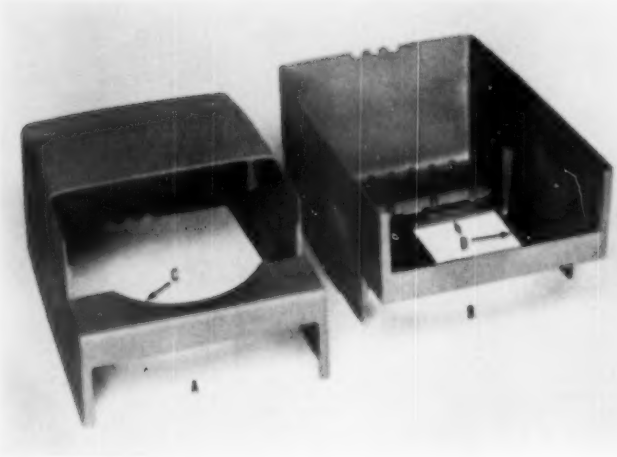
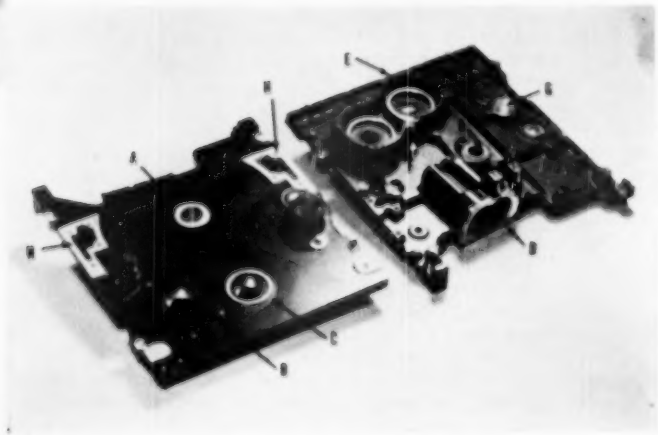



Figure 2. Pictured above are two main housings, important parts of both recorders and transcribers. Despite their wall thickness of only .093, the housings are both rigid and free from surface defects because of proper design, including location of ribs, and the favorable mechanical properties of magnesium. A is the main housing for the recorder and B that for the transcriber. They are identical except that for use on transcriber, rectangular opening C and circular segment D are punched out.

Figure 3. Requirements fulfilled in design of the main frame, *below*, include ample rigidity, integral mounting details and completely sealed in construction with permanent lubrication. Shown are the turntable center, A; recording arm pivot center, B; playback arm pivot center, C; main drive gear housing, D; recorder and playback gear housing, E; rear worm shaft hole, F; optical mount center, G; and cover bracket pads, H. Gear centers and dimensions A to B and A to C are held to a tolerance of .0004 on a Heald Bore-Matic equipped with four boring heads. The advantage of the die casting for this type of machining lies in the fact that dimensions can be cast close enough that only a small amount of stock needs to be removed.




nesium castings used weigh 3 pounds and 10 ounces, whereas in aluminum these parts would weigh 5 pounds and 7 ounces, and in zinc 13 pounds and 6½ ounces.

The wall thickness used in the final magnesium design, as well as other design considerations indicate that it would be impossible to compensate for this weight advantage of magnesium by reducing wall thickness and using zinc. As for aluminum, minimum thickness is the same as for magnesium; compensation would therefor be likewise impossible.

The main housing (1) and the main frame (2) are the most important components of this group and at the same time presented more problems in design, tooling and production than the other parts.

### Light Weight, Compact Housing

The main housing measures 8½x11¾x6 inches high and weighs only 1 pound and 7½ ounces. Considerable care was necessary in the design of this housing in order to obtain a pleasing, smooth exterior and at the same time achieve the greatest compactness. Ventilating slots are cast on two sides and at the top rear, but the arrangement is such that they appear decorative rather than functional, enhancing the appearance of the exterior.

In order to facilitate the flow of metal to the rear vertical panel of these castings, eight shallow ribs, 7/32 inches wide x 1/8 inches deep, are cast longitudinally under the ventilating slots at the top rear. These ribs also serve to strengthen this slotted part of the casting.

Transversely, there are only two ribs cast, one ½ inch high, just in front of the top ventilating slots, and one near the front edge of the top surface, where the casting is gated. Two bosses are cast along each of the two side walls for mounting the main frame. These bosses have cored holes and require only a

tapping operation. Machining operations consist only of tapping these four holes and drilling two holes in the rear vertical wall. The thin flash cast in the ventilating slots is removed by a die-trimming operation at the die casting plant.

The general wall thickness of this casting is only .093. However, the proper design and location of ribs, and the favorable mechanical properties of magnesium result in a casting which is remarkably rigid and at the same time free of surface defects.

The surface of these castings is so excellent that no mechanical prefinish treatment, such as buffing or polishing, are necessary. Finish consists of the following:

1. Chrome pickle before machining.
2. Degrease in trichlorethylene after machining.
3. Preheat to 400F in a convection type oven.
4. Prime coat of grey alkyd base primer (Standard Varnish Works).
5. Bake for 20 minutes at 275F in infra red conveyor type oven.
6. After cooling, spray with fine grey wrinkle enamel (Pittsburgh Plate Glass Co., Paint Div.)
7. Bake for 20 minutes at 275F in infra-red conveyor type oven.

### Durable Finish Is Glare-Proof

The finishing procedure outlined above results in a very fine grain, glare-proof exterior with excellent abrasion resistance and hardness. The use of a glossy or semi-gloss finish was considered undesirable by Soundscriber, on account of bothersome light reflections which are often encountered with glossy finishes, and which would therefor be a definite handicap in the daily use of the equipment.

The main frame measures $8\frac{1}{2}$ x 9 inches and while it has two

(Continued on Page 60)

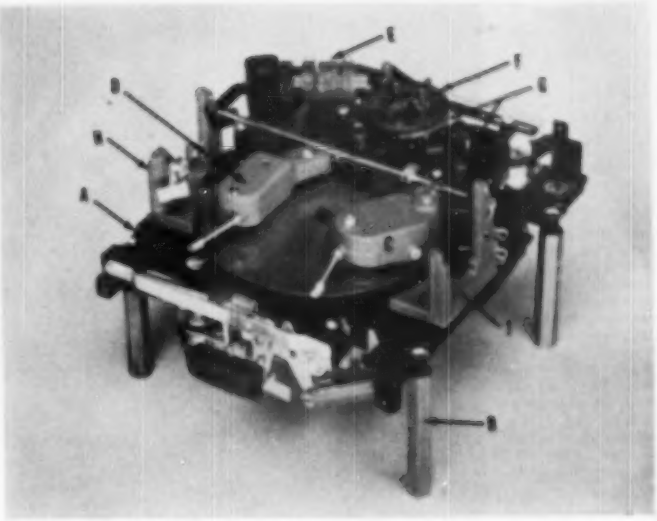



Figure 4. All mechanical and optical components, motor and recording and playback arms are shown assembled to the main frame. A. Supports, B, are used during assembly process only and are removed prior to subsequent assembly with electronic chassis. Also shown are recording arm, C; playback arm, D; optical system housing, E; mirror mounting, F; sector gears, G; and cover brackets, H and J.

Figure 5. Die castings of magnesium used in a transcriber, a companion machine to the recorder, are pictured below. They were selected because they offered flexibility of design along with rigidity and lightness. Shown are front cover, A; cover for optical indexing mirror, B; playback head cover, C; playback arm trunnion, D; and playback arm stanchion, E. Notice the fine, grey wrinkle enamel which has been chosen as a finish because it does not produce annoying reflections and highlights. It also has excellent abrasion resistance.

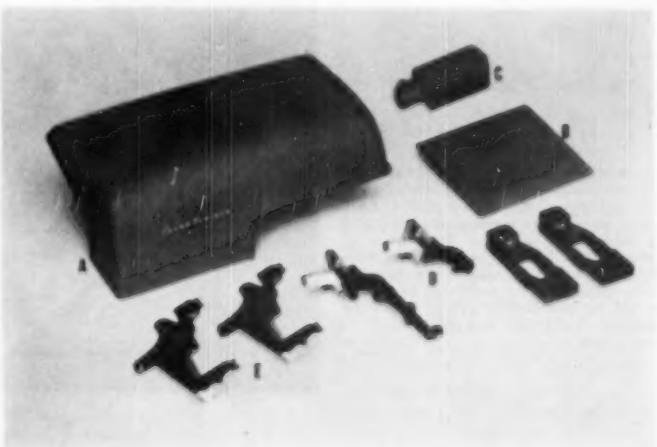
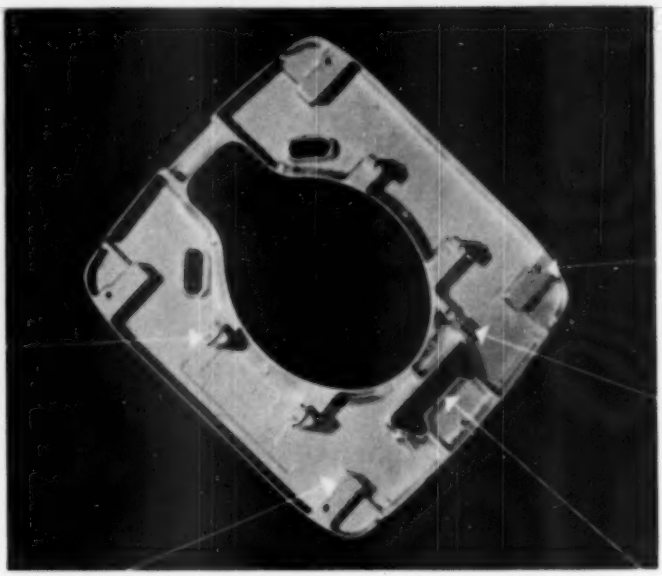


Figure 1 →



Four lugs to hold a pan have undercuts which are less expensive to form with knockout cores than by machining the undercut or attaching separate pan retainers. The pan is slipped inside these four lugs and is held firmly in position by them. This feature would not be feasible by any other fabricating method.

Four small cored holes need only tapping to receive the screws that hold rubber suction caps. This permits use of the Toidey base on standard bathroom equipment.

By drilling a hole through this section, a boat wire latch is inserted to lock the pan securely in place for an extra safety feature. Such a latch would be far more expensive to attach by any other fabricating method.

Heavier sections are provided in which horizontal through-holes are drilled to receive the formed wire legs. The result is legs which are durable and sturdy, but simple to form and attach.

Three specially-shaped holes provide a means for attaching the smaller plastic and wooden models of Toidey seats, so that the units which are designed for small children can be given the increased versatility of the die cast base.

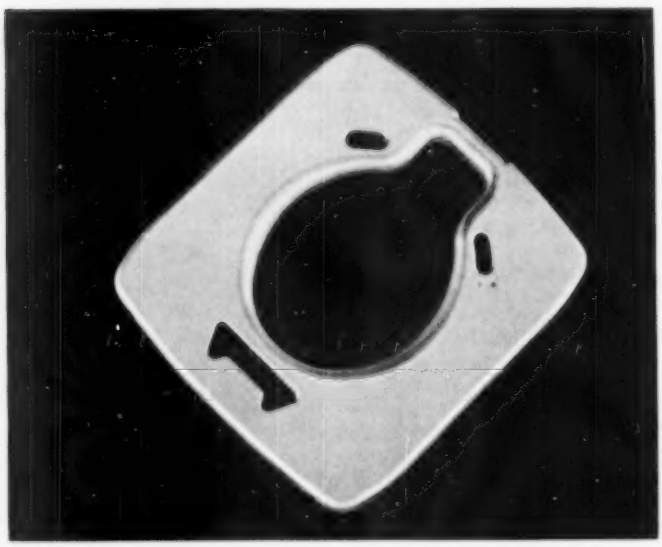


Figure 2. Without extra polishing or buffing, the aluminum die cast Toddler's Toidey can be successfully finished with a coating of white synthetic enamel which is baked to impart extra hardness. The amount of labor involved in fabricating this piece from wood is prohibitively expensive; on the other hand, molded plastic would not be rugged enough for such built-in features as the leg supports, pan retainer and safety latch.

# Die Cast Base Increases Versatility

**Because it is the only method of combining a number of special features into an inexpensive, yet sturdy unit, die casting has extended the range of usefulness of this equipment for child training.**

THE versatility of one of the basic tools for child training has been greatly increased recently by the introduction of what is called a Toddler's Toidey. This is a die cast aluminum toilet seat designed especially for the child who starts his training habit during the latter half of his second year, but it is also an important adjunct to the other Toidey units which have, during the past 25 years, come to be recognized as a major factor contributing to the child's sense of independence and security.

Pediatricians and psychiatrists have pointed out that proper introduction to the habits of elimination can play a most significant part in character development, and it is therefore important that the environment and equipment for the child's training be carefully planned.

This new die cast Toidey has been designed to conform with recommended practices in child training and also, to extend the usefulness of the other units manufactured by The Toidey Company of Fort Wayne.

For example, the Toddler's Toidey may be used either independently as a complete unit, or as a base for the molded plastic or wooden Toideys which are designed for both introduction to toileting and (with this) to complete follow through. It may be supported by its own legs, or the legs may be folded away and the unit attached to a regular toilet seat by means of four rubber suction cups. It is compact enough to be taken along while traveling or it may be set up permanently at home.

The new die cast base makes the Toidey adaptable to the special needs of the growing child from the time he is able to sit up by himself until he graduates from the need for individual equipment. Only by the use of a die cast base has it been possible to combine all of the desired features and still keep the price within an acceptable range.

A glance at Figures 1 and 2, showing the top and bottom sides of the aluminum die casting, will reveal the many built-in features which have been obtained integrally by this process.

### Knockout Cores Form Undercut Pan Holder

In order to support the pan beneath the Toidey seat, four retainers have been formed as part of the casting. *Each of these involves an undercut that has been formed by separate knockout cores.* While this feature tends to slow the casting cycle, it produces a necessary feature at lower additional cost than would be possible either by milling the recesses or by attaching separate pan retainers.

In addition to the four undercut pan retainers, special provision has been made underneath the die casting for mounting a spring wire latch to lock the pan into position. Thus, the complete support for the pan and a safety feature to clamp it, have been provided integrally. Only one drilling operation and the insertion of the spring wire latch are required.

### Attaching of Legs Requires Only Drilling Operation

To make a unit of maximum serviceability, it was necessary to have legs which are sturdy and rigid enough to support the base independently, but which can also be folded out of the way easily in order to attach the base to a standard toilet seat. The problem was to do this without complicated hinging and mounting mechanism.

Figure 1. With its folding legs, rubber suction cups and light weight, this Toddler's Toidey is useful as an independent unit or mounted on a standard toilet.

A pair of simple, strong, formed wire legs have been util-

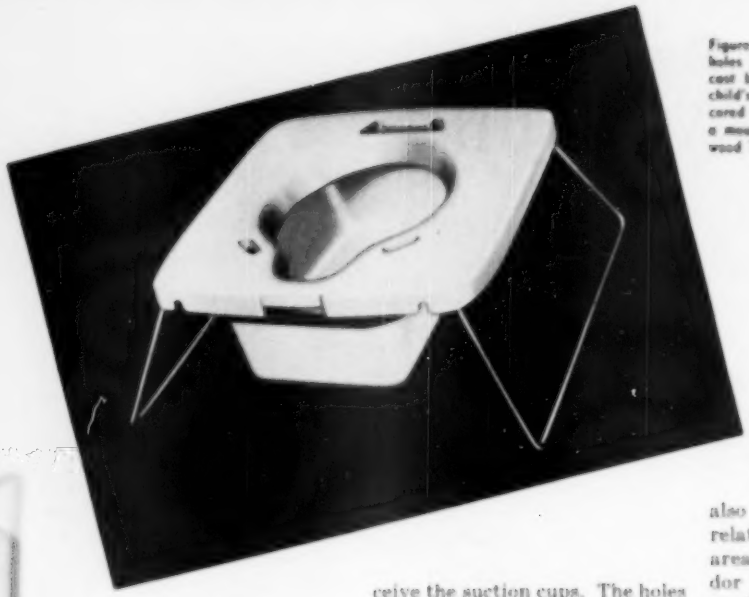


Figure 4. Formed wire legs inserted into holes drilled into solid portions of the die cast base are strong enough to support the child's weight. Notice the three small holes cored through the die cast base to serve as a mounting means for the smaller plastic or wood Toidey unit.

ized, the ends of which are inserted in four holes drilled into solid sections formed at the undercorners of the die casting.

Because these four holes lie in a plane parallel to the die parting, it was found to be less expensive to drill them than to attempt to install moving cores in the die. However, the ability to vary thick and thin sections to place metal where it is needed made it possible to introduce four solid sections into which the holes are drilled.

*Drilling of these four holes and inserting the U-shaped bent wire legs are the only necessary operations, and yet a rugged, dependable and inexpensive hinging arrangement has been achieved.* No hinge or separate mechanism has been necessary.

Figure 3 shows the Toddler's Toidey in use, and illustrates the way in which the legs support the unit. For traveling, the legs fold up underneath and for use on an adult toilet seat these legs easily detach.

So that the Toddler's Toidey may be used on regular seats, rubber suction cups are affixed for attaching it. The means for doing this has also been obtained integrally in the die cast base. Four heavy die cast pads with cored holes are designed to receive the suction cups. The holes require only tapping to receive the screw fasteners for the cups.

In addition to all of these built-in features, as provision for supporting the plastic or wooden Toideys, three specially shaped holes for attaching the smaller units can be seen in Figure 4. There is also allowed space for attaching a specimen bottle underneath the base.

### More Expensive in Wood

Not only would it be prohibitively expensive to fabricate such a unit from wood, incorporating all of the features mentioned above, but the piece price for wooden construction would be the same, whether produced in dozens or thousands of units. On the other hand, die casting is intrinsically a high volume method which becomes more economical with an increase in quantities.

The greater strength and rigidity of metal as compared with molded plastic has been essential for such features as the attachment of supporting legs or the pan retainers. Aluminum has been selected as the alloy because of its lightness, its resistance to corrosion and its freedom from warpage. It has a high strength-to-weight ratio which is also valuable.

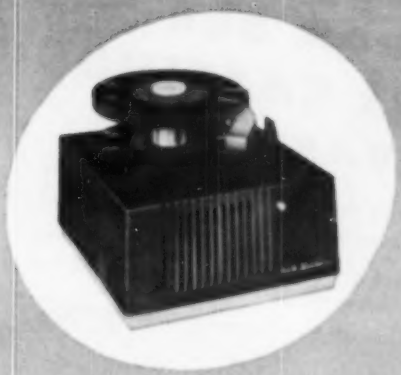
Smooth surfaces as cast are also important and, despite the relatively thin section and large area of the die casting, the vendor has been able to produce a surface which needs no buffing or polishing and only a minimum of grinding on the parting line.

Contours have been achieved readily and a single trim die is required to remove flash. Obviously, a smooth surface and flash-free edges are essential.

To finish the base, The Toidey Company applies a coat of a white synthetic enamel which is baked to impart hardness. The paint adheres firmly to the metal without any chemical pretreatment other than a standard vapor degreasing for cleanliness.

It is not an exaggeration to state that the incorporation of so many specific functional advantages would be impossible by any other fabricating method at a comparable price. Although these features were visualized a number of years ago, the war years interfered with the immediate realization of the design due to shortages of metal and die casting capacity.

Now, this idea introduced and developed through its many stages of improvement by Miss Gertrude A. Muller, president and founder of The Toidey Company, has been given further adaptability and training value by means of the die casting process.



# Zinc-base die castings

## have major role in RCA Victor's famous 45-rpm record changer

In RCA Victor's revolutionary 45-rpm record changer, Model 9-EY-3, the turntable, pinions, spindle, main cam, cycle lug and star wheel are die cast. Four of these components are produced as a single zinc-base die casting. Zinc of proper quality assures the dimensional stability over a prolonged period vital to this product. ANACONDA ELECTRIC® ZINC, 99.99+% pure, is *always* dependable. Anaconda Sales Company, 25 Broadway, New York 4, New York, Subsidiary of Anaconda Copper Mining Company.

The record-changing mechanism is housed inside the enlarged central post of the zinc base turntable die casting shown here. Zinc-base die cast pinions fit down inside the top of the central post. Photograph and data by courtesy of the Radio Corporation of America and the Doehler-Jarvis Corporation.

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Figure 1. The use of 25 die cast parts in the coin changer, right, reduced machining, finishing and assembling operations and equipment to a minimum and resulted in an efficient and attractive product. As a result, the changer is marketed on both a price and a quality basis. The black wrinkle finish of the base provides an effective contrast for the brilliant, reflective chrome-plated tubes.

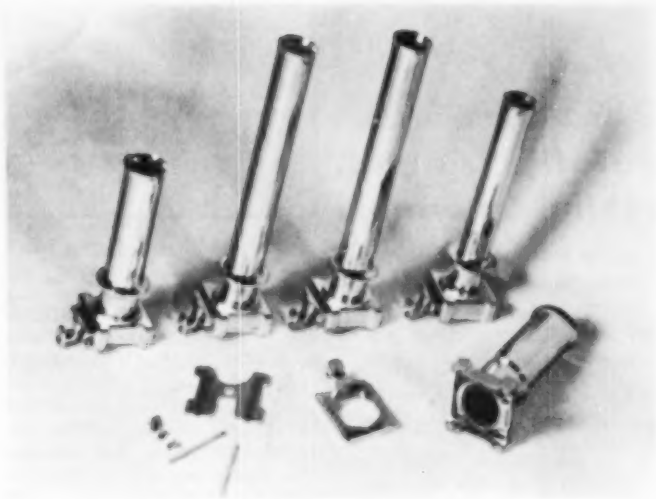


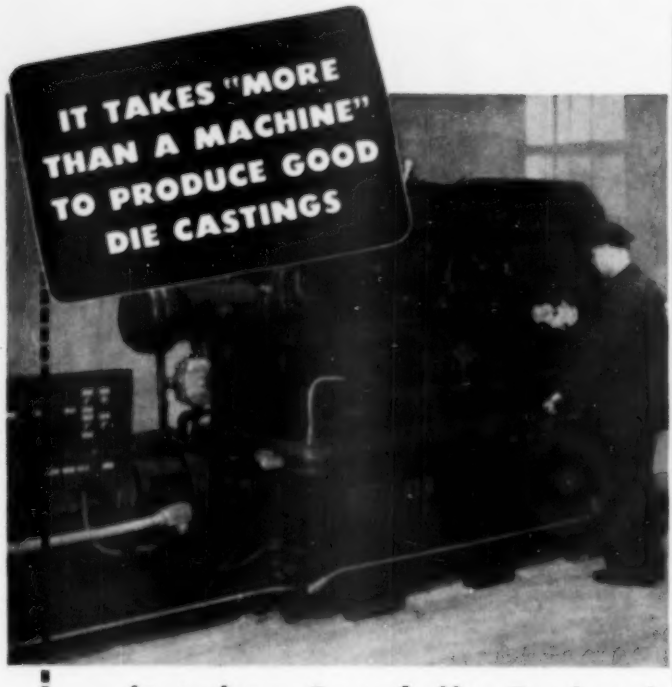
Figure 2. Casting of the attractive, cylindrical-shaped coin tubes, at left, presented a problem in the even and rapid distribution of molten metal in the die cavity. This was solved by using a ring gate. Shading of chrome when plating the tubes was caused by the difficulty of throwing chrome through the cored peep holes in the tube and was overcome by leaving a web of flash in the holes. The web is later punched out.

# Plated Die Cast Tubes Solve Special Problems

A DIE casting die can more than compensate for its seemingly high original cost by producing an efficient and attractive product that needs only a minimum of machining, finishing and assembling and, therefore, one that can be marketed on both a quality and a price basis.

Such is the case with Leese Industries, Everett, Washington, which uses 25 zinc die cast parts in one of its line of coin changers, the Senior model pictured in Figure 1. Die castings were chosen by the manufacturer as being the lowest cost in the overall picture after careful study of manufacturing processes and materials available, including stampings, spun tubing and wood.

Once die casting had been se-




## ..... it takes Carefully Trained, Highly Skilled Machine Operators

The actual "shot" which produces a die casting is the shortest step in the entire die casting process. Once the die is accurately anchored into place and the alloy in the melting pot brought to the proper heat . . . the production of castings proceeds at a predetermined rate, with very little interruption.

This rate varies with the alloy used, the size of the die cavity, the simplicity of the die design and the particular type of machine employed.

In the early days of the industry the operating cycle of a die casting machine was relatively slow. Machine movements were manually operated and controlled to a large extent. Today, very little manual effort is required but the operating cycle of die casting machines has been speeded up tremendously.

A special type of skill and knowledge is required of machine operators. It is their job to keep the production of castings flowing at an even pace, to constantly check the dies and machines so that quality never varies. An added duty of the seasoned operator is to teach and train newcomers so that as new machines are added, experienced operators will be available.

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lected the manufacturer *needed little other equipment to complete his product. This equipment included a small drill press, an inexpensive bench lathe, a paint gun, air compressor and paint spray booth.*

Casting of the coin tubes, Figure 2, presented the greatest difficulty. The problem of even and rapid distribution of molten metal in the die cavity for each of the cylindrical-shaped tubes was solved by using a ring gate. However, the use of the ring gate, in turn, presented difficulties in that it is harder to trim from castings than conventional styles of gating. The use of such a gate also made it difficult to obtain smooth, non-porous surfaces suitable for plating. The ring gates are cut off on a lathe at which time the top of the casting is machined smooth.

THE SENIOR model coin changer is designed for use in restaurants, drug stores, theater ticket booths and wherever accuracy and durability are demanded of such a product. At the flick of a finger the changer automatically dispenses five nickels, five dimes, four quarters or two halves. It is an attractive product with a black wrinkle-finished base and five interchangeable chrome plated coin tubes and slide housings.

Small peep holes cored at intervals along the length of the tubes also presented difficulties since they cause turbulence in the flow of the metal, trapping air behind the cores and causing surface blemishes which mar the "hardware" finish desired.

*During plating a slight web of flash is left in the peep holes to prevent difficulties that arise from attempting to throw chrome through the holes. If flash is not left in the holes, the area around the holes often has no chrome and is a different*

(Continued on Page 68)

*Aluminum and Zinc Base*

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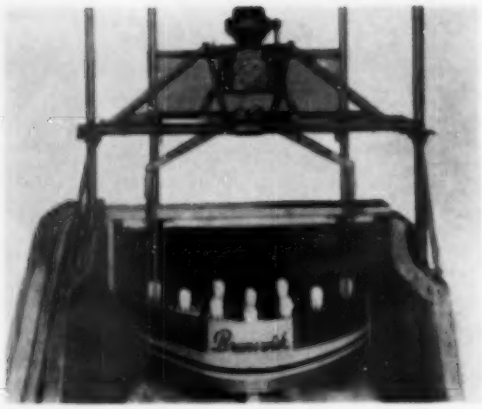


Figure 1. In the course of an evening's bowling, tons of bowling pins are thrown into the compartments of this Brunswick B-10 Electric Semi-Automatic Pinsetter where they are held in proper position by two die cast aluminum spotting collars. This mechanism is designed to speed up the bowling game for the benefit of bowlers, proprietors and pinboys.

# THE PERFECT SET-UP

FEW die castings are subjected to more constant punishment than the die cast aluminum spotting collars which go into every Brunswick* B-10* Electric Semi-Automatic Pinsetter produced by The Brunswick-Balke-Collender Company of Chicago, manufacturers of a complete line of bowling and billiard equipment.

Ten identical aluminum alloy die castings go into each machine, Figure 1. These spotting collars are attached to the middle frame of the machine and encourage the pins to fall naturally into the correct, inclined position on the loading deck as the attendant retrieves the scattered pins from the alley.

*Each pin boy tosses several tons of bowling pins at these spotting collars during an evening's session* and, since speed of setting them up is desired by everyone—the bowler, the proprietor and the pin boy—it can be understood that he is not likely to be gentle about the way in which the pins strike against the die cast collars.

For this reason, the die castings have been carefully designed with regard to both the cross section and reinforcement of stressed parts. The die cast collars, Figure 2, have upright projections which catch the base of the bowling pins. A slight overhang (which provides an undercut that complicates the die design) helps to prevent the pin from bouncing out of or over the retainer.

### Reinforced Against Impact

As reference to the drawing, Figure 3, will show, this upright projection which takes the brunt of the impact has a cross section which is graduated from 1/4 inch at the base to 3/16 inch near the top. Radii at the base of this section are ample, 5/16 and 1/8 inch. Thus, *cracking at these points is prevented, and improved flow of metal through the die cavity enables the die caster to obtain a sound metal section relatively free of porosity or blow holes.*

To produce the undercut formed by the overhang, interlocking die halves have been used. The cover half of the die has a long tongue-shaped extension which lies inside the ejector half to produce the undercut. However, this presents one special problem in finishing.

Smooth surfaces are absolutely essential because the high quality finish of the bowling pins may not be scratched or marked by sharp edges or flash. The projecting, interlocking die halves leave flash marks along the die casting in such a position that most careful trimming and grinding is necessary to remove all traces of fins.

*Trademarks of the Brunswick-Balke-Collender Co.

Other than the fact that all surfaces in contact with the bowling pins must be smooth and free from flash, finish is not important. No buffing or surface treatment is needed. For general purposes of clean appearance and freedom from corrosion, the aluminum alloy proves to be very satisfactory since it retains its brightness and is not subject to rust. A thin, transparent coating of aluminum oxide forms on the casting when exposed to the air and effectively seals the surface against chemical activity.

### Annual Production 50,000

Pinsetters are large pieces of equipment produced and sold in somewhat limited quantities compared with the volume normally considered ample justification for investment in die casting dies. However, the fact that ten spotting collars are used in each machine boosts the quantity of parts above the point where die castings are more economical than other types of castings for this purpose. Annual production of spotting collars is estimated upwards of 50,000 pieces.

Permanent mold aluminum castings were also investigated for this component and would have produced an equally satisfactory part from the service and durability standpoint. However, in the quantities needed, die cast spotting collars offered a lower cost.

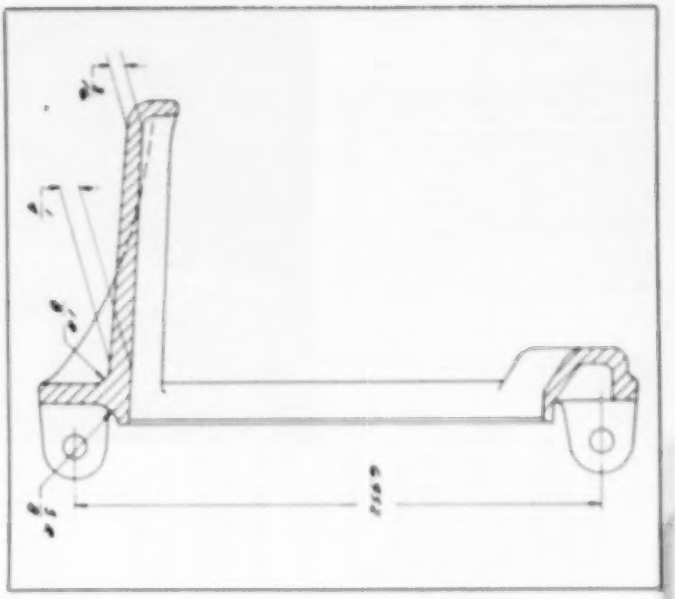


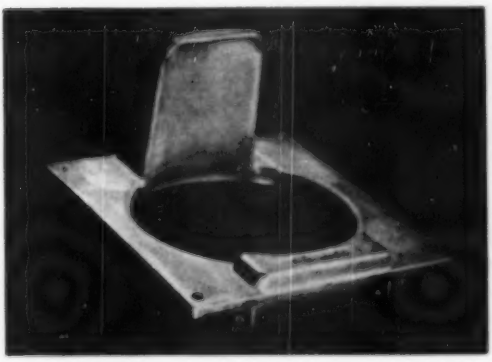
Figure 2. Notice the ample cross section and generous radii of the die cast spotting collar. These provide reinforcement of the upright portion against impact, and encourage smooth flow of molten metal into the die to obtain as sound a casting as possible.

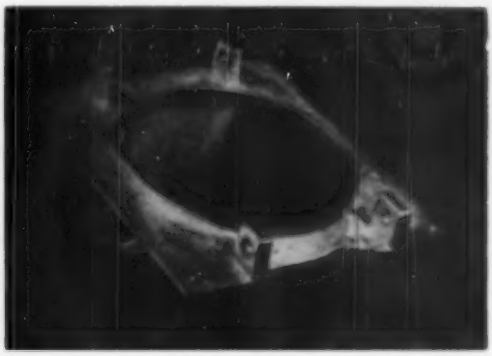
The alloy in which the spotting collars are die cast is ASTM S-9 which corresponds to commercial alloy designation 13 and has a composition including 11 to 13 per cent silicon. This alloy has excellent physical properties and is readily castable, thus accounting for its popularity as a general-purpose alloy. Its ultimate tensile strength is 33,000 psi, Charpy impact is 2.0 ft. lb., and shear strength is 22,000 psi.*

Few dimensions on the casting are critical, although flatness and alignment of holes for

(Continued on Page 70)

Figures 3A and 3B, *below*, reveal the top and bottom details of the die cast aluminum spotting collars. The slight overhang on the upright portion of the collar is necessary to prevent bowling pins from slipping out of place, but offers a difficult die casting problem by creating an undercut. The finishing of all fins and parting line burs is extremely important in order not to mar the bowling pins.





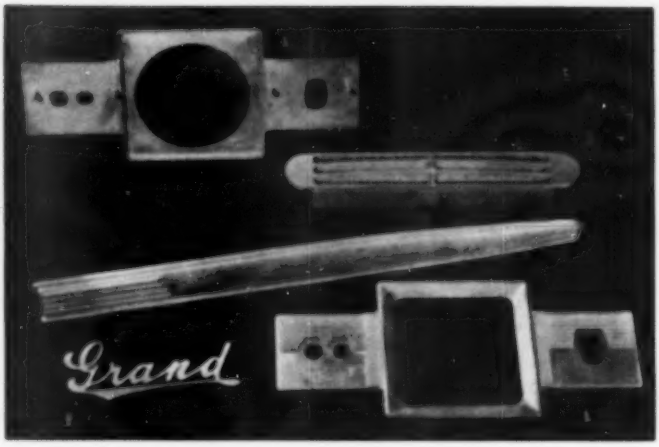



Figure 1. Die cast parts, right, are used in the Model 850 gas range made by Grand Industries, Inc. The bezel (A) features decorative ridges that break up large flat surfaces that could be difficult to plate. The nameplate (B) has cast bosses for attaching to the backguard with special fasteners. Mounting sections in handle (C) are strengthened and lightened by reinforcing ribs. The aluminum flue deflector (D) has a parting line that is at an angle from the parting line of the die in order to secure the desired deflection angle.

# Die Cast vs Stamped Stove Trim

WHEN die castings and stampings can do a job equally well it is necessary to decide which method of fabrication is the least expensive in order to make a choice between the two. This is especially so when each can be plated at approximately the same cost.

Figure 2. The gas range, below, uses die cast parts because cost comparisons showed them to be least expensive.

When designing their Model 850 gas range, Grand Home Appliance Division, Grand Industries, Inc., of Cleveland, Ohio, selected die cast parts over stampings because cost comparison showed that the low unit cost available through large scale production and usage of die castings resulted in a lower over all cost. Plastics were given only momentary consideration before being rejected because of the heat to which stove parts are exposed.

Among the die cast parts used for decorative and functional purposes on the gas range are a backguard bezel, four handles and a nameplate of die cast zinc and two flue deflectors of die cast aluminum. All are plated except the deflectors which are polished.

Most interesting from a design point of view is the backguard bezel. It has decorative ridges on either end which also serve to break up a large flat surface which otherwise would be difficult to plate.

The ridges are stopped just short of the edge of the bezel, thus making a simple trimming silhouette. This is an example of good design in that it makes for faster and more accurate trimming with cheaper trim dies.

The two ends of the bezel are blended into the raised portion, which frames the clock, by a decorative and utilitarian ridge. The ridge joins two sections of unequal thickness and is installed at a point where molten metal flows around a corner and could have a tendency toward turbulence. The ridge eliminates this turbulence and insures proper filling of the die cavity without an excess of surface blemishes. It also permits use of sections that approach the thinness of stampings and results in a saving in the amount of metal used.

The rigid bezel also serves as a base for a clock, top light and oven light switches and an electric socket which are inserted into four cored holes.

Cast-in recessed letters designating the light switches are used instead of letters which project above the surface of the bezel. These letters are difficult to make since they project above the surface of the die and, consequently, are more subject to wear than letters which are recessed in the die.

The bezel is fastened to the backguard with cast bosses which are inserted through the backguard and secured with Speed Nuts.

Four handles, two left and two right, also have decorative ridges to increase the ease of plating, but still have large unbroken areas that can cause plating difficulties. Two mounting sections by which bolts fasten the handles to the stove are designed with reinforcing ribs to strengthen the handles and to eliminate heavy section thicknesses. Since the handles only touch the stove at these two spots, they transmit little heat.

### Script Name Plate Is Easily Attached

The name plate is script-style lettering with two bosses for insertion in the backguard with Speed Nuts. The design problem here was to insure a minimum of flash so that trimming operations could be kept as simple as possible.

The flue deflectors are bolted into the backguard to deflect heat given off by the stove and are made of die cast aluminum rather than zinc to withstand the heat. The deflectors have uniform section thickness and two parallel ribs and a cross piece to act as a grille. It is interesting to note that the parting line of the deflectors is at an angle from the parting line of the die. This was necessary in order to secure the deflection angle.

The deflectors have ejector pads on the top or exposed portion to overcome any tendency of cores used in the grillework to bind in the cover half of the die. The ejector pin marks are ground after the pieces are removed from the die and the top portion of the deflectors is polished to a high gloss.

### SUNDBERG-FERAR TO DESIGN NEW RADIO-TV LINE

Sundberg - Ferar, industrial designers, announced recently that the firm had been appointed to design a new line of radio and television receivers for the Colonial Radio and Television division of Sylvania Electric Products, Inc., New York.

With this new account, Sundberg-Ferar is now actively retained as consultant designers in the fields of automotive, appliance, business equipment and general product design by 31 manufacturing concerns in ten states.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# Five Product Design Case H

By DAVID H. THORBURN
Chief Engineer
The Powers Regulator Co.

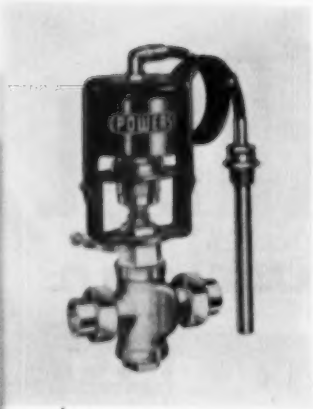
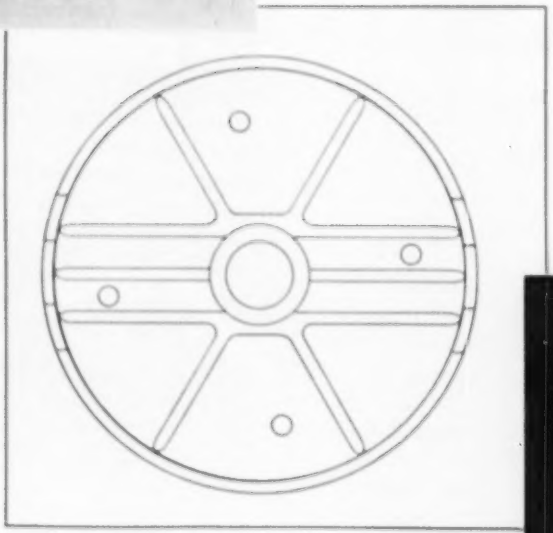



Figure 1. Originally produced from pressed steel with spot welded steel legs, the upper shell of this self-operating temperature regulator has now been redesigned as an aluminum die casting after thorough investigation of stress patterns, cost estimates and production methods.

PRELIMINARY stress analysis is as important a part of development engineering at The Powers Regulator Company of Chicago, Ill., as are cost and production comparisons. In the instruments which this company manufactures for measuring, recording and controlling temperature, any changes in design, materials or methods are introduced only after the most careful investigation and testing.

For example, close attention has been given to the special conditions of service under which each of the five applications of zinc or aluminum die castings described below is expected to function, before setting up final materials specifications. The factors coming under consideration in each instance are worth examining.

Although some spectacular savings have been reported as a



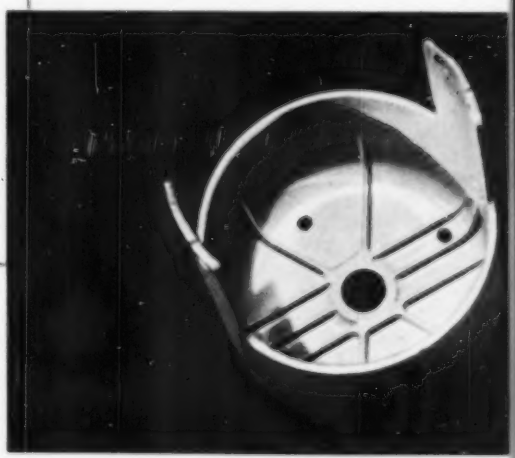


Figure 2. Experimental models in which ribs were silver soldered into spun copper heads were tested to determine the amount of deflection and rigidity under load stresses before arriving at the best rib arrangement, illustrated above. Interestingly, the deflection tests conducted on the final die cast heads duplicated almost identically the results obtained on the preliminary model.

# stories

direct result of redesign calling for die cast components, this has been principally on the basis of secondary operations rather than on piece costs.

## 1. Steel Weldment vs. Die Cast Aluminum

When the stamping dies for the steel shell used on a self-operating temperature regulator, Figure 1, were in need of replacement, the possibility of substituting a die cast aluminum piece was suggested.

Cost estimates showed that the investment in a die casting die would be approximately the same as for tools to form the shell from steel sheet stock. Production line savings were distinctly in favor of the die cast piece partly due to the fact that the legs on the steel piece were cut from strap iron and spot welded into place.

The question was then raised whether or not a die casting would be as satisfactory as a steel weldment for this application. The function of the shell is to house a bellows connected to the valve and, during operation, the head of the shell is subjected to approximately 300 pounds thrust.

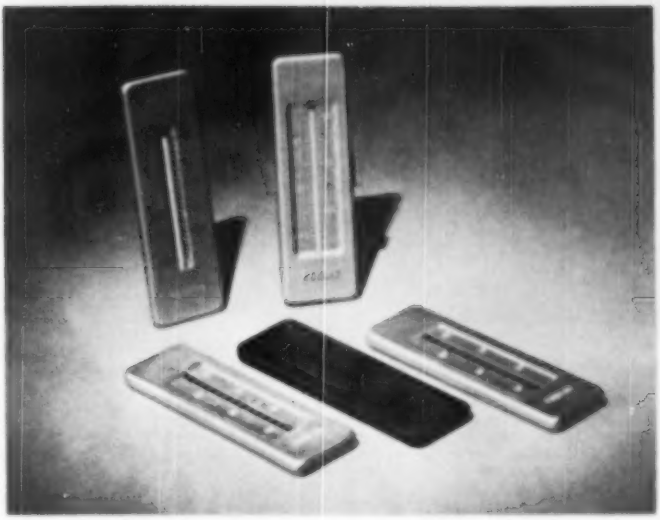


Figure 4. Savings amounting to about 66 per cent have been realized by switching from a stamped thermometer housing, *left*, to the die cast unit, *right*. This is due principally to a reduction in assembling operations for the thermometer tube and the elimination of such secondary operations as stamping numerals and name. Notice also that the cast shadow of the die cast numerals improves their legibility—the stamped numerals required filling with black paint to be read. A raw die casting is shown in the foreground along with castings finished in black and metallic bronze paint.

*Minimum deflection of the head is essential to obtain proper valve travel and also, sufficient rigidity must be built into the shell to resist fracturing under repeated loading.* One of the characteristic advantages of the die casting process—the ability to place metal where it is needed for reinforcement—was used to solve this problem. Ten ribs, $\frac{1}{4}$ inch deep and $\frac{1}{8}$ inch thick, were arranged inside the head, Figure 2.

*Exhaustive compression tests were run beforehand to determine the most effective rib pattern.* A set of sample heads was spun from copper, legs were mortised in and ribs were silver soldered in various patterns. *Deflection tests indicated which rib pattern best fulfilled the requirements.*

This testing served as a guide for planning the ribs used in the die cast shell shown in Figure 3. It is interesting to note that similar *tests conducted on die cast shells produced results almost identical with those on the original models, thus substantiating the correctness of preliminary studies.*

It was decided, however, that due to differences in physical properties, the aluminum alloy die casting would be designed to have smaller deflection. The steel shell had a deflection of .009 but this has been reduced to .003 for the aluminum to preclude danger of fracturing or fatiguing under repetitive load. The die cast wall section is $\frac{1}{8}$ inch.

The steel shell was fabricated by deep drawing the head and then spot welding strap iron legs. The welding is now eliminated by die casting the shell in one piece. The legs, constantly under tension, have ample strength to resist deformation.

Figure 3. In order to compensate for the physical differences between steel and aluminum, the amount of deflection has been reduced from .009 to .003 to preclude any danger from fatiguing under load. This shell, having an average wall section of $\frac{1}{8}$", is subjected to approximately 300 psi thrust.

Figure 5. By standardizing about eight different styles of handles, production quantities were raised high enough to make possible tool investment for this attractive die cast zinc handle. Splines are cored to dimension. No spline failure has been reported out of the 40,000 die cast handles now in use.

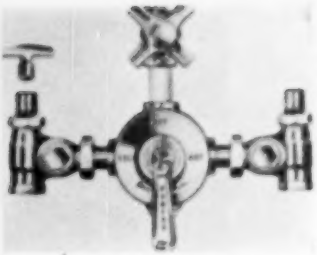


Figure 6. Type H water mixer, left, makes use of the new die cast handle in place of sand cast brass previously used. This results in a smoother, better-looking handle which is less expensive to finish.

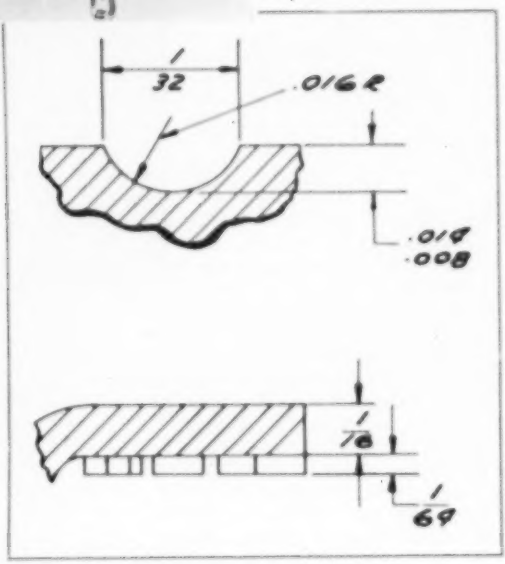



Figure 7, right. Cross section through the lettering on the handle is shown above, and reveals the shallow, easily cleaned radius for purposes of sanitation. Shown below is a cross section of lettering on the thermometer which is raised. This is less expensive because it is easier to machine into the die.

Side holes have been punched because it proved to be less expensive than coring them, and the company name plate is a separate brass plate attached with drive screws rather than included as an integral part of the casting.

*Cost comparisons of finished parts show a 25 per cent saving brought about by die casting.*

Alloy used is ASTM aluminum alloy AXS 679 Rev. 3.

## 2. Cost Cut 2/3 On Thermometer Plate

Important savings have been earned by changing the thermometer plate, Figure 4, from a stamping to a die casting and, at the same time, greater legibility and improved appearance have been obtained.

The plate was previously formed from sheet brass, and required two separate brass straps on the back to attach the thermometer tube. Four dies were used: 1) a blanking and drawing die, 2) a trim die, 3) a numbering die, and 4) a die for blanking and forming the strap. Then the strap was drilled, tapped and soldered to the rear of the plate.

Soldering was slow and awkward because it involved accurate positioning of the tube in relationship to the temperature calibrations stamped on the plate. Maximum soldering production was 30 pieces per hour. Now, due to the accuracy inherent in the die casting, and the position of mounting bosses formed as part of the plate, the separate strap for the thermometer has been eliminated and the strap which is used to attach the plate to the thermometer housing also holds the thermometer to the plate. Holes for mounting are cored and are either tapped, or else thread cutting screws are used.

*Good die casting practice calls for raised lettering because this is simpler to engrave into the die and is less likely to become worn or damaged by the impingement of hot metal.* It also has the advantage of being more legible than incised lettering stamped into the metal.

It was necessary to fill the latter with black paint for easy visibility. A slight tendency for the stamped plate to deform during numbering resulted in bulges between lines and further contributed to poor legibility. *The raised, die cast numerals and lines cast a shadow which makes them more readable.*

Two standard finishes are applied to the untreated zinc die castings as shown in Figure 4. A bronze, baked lacquer with satin finish is applied on plates to be used in school rooms, hospitals, offices, etc., but for industrial use, a black, baked lacquer is used.

The alloy in which the thermometer plates are die cast is

ASTM zinc alloy XXIII. Costs have been reduced by approximately two-thirds.

### 3. Many Handles Standardized

As simple a part as a handle, Figure 5, can be die cast to gain many advantages. Previous to the die cast handle shown above, which is used on Type H water mixers, Figure 6, seven or eight different sand cast brass handles were used on various models. *No one model was produced in sufficient quantities to justify die casting tools, but by standardizing them into a single design, the quantities were boosted high enough to make die castings more economical.*

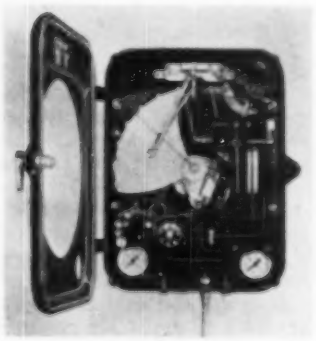
Cost has been cut more than half on this handle which is die cast complete with splines. *No spline failure has been reported out of the more than 40,000 die cast handles now in use.* Splines are approximately .025 deep and require no broaching.

In contrast to the type of lettering formed on the die cast thermometer plate, recessed letters are used on the handle. The drawing, Figure 7, compares the cross section of these two lettering applications.

Although recessed lettering is more expensive, it was used here because the water mixers are used extensively in hospitals where sanitation is a primary factor in even the simplest piece or fitting. The recessed letter has a shallow, controlled radius which wipes out readily with passage of a cloth over the surface of the handle, and yet its profile is substantial enough to wear well in the die.

The handles have an extremely heavy cross section which might ordinarily be expected to produce pinholing or defects

Figure 8, above, shows a small die cast spiral mounting sector used to hold the coil spring which can be seen in the extreme upper right-hand corner of the Series 100 recorder-controller shown in Figure 9, below. Holes, raised surfaces, irregular profile and gear segment are all formed integrally.

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along the die parting after flash is trimmed. However, careful die venting has virtually eliminated this problem, and a high quality nickel-chrome plate is applied.

### 4. Complex Sector Developed from Model

Another example of the advantages obtained by fabricating a complete and accurate model before freezing the design is to be seen in the spiral mounting sector, Figure 8. This part is used to mount a thermostatic spiral in the Series 100 recorder-controller, as shown in Figure 9.

Cost-cutting was a primary determinant in the specification of this complex little die casting. The alternative method would have been to fabricate a group of punch press and screw machine parts by staking or soldering. Several production fixtures would have been required, and considerable assembly time would have been consumed.

Here, die castings have provided the means for combining into a single piece, an irregular shape, gear teeth, several holes and slots and mounting bosses. Since ample provision has been made for adjustment, dimensions are not too critical, although flatness and dimensional stability are important.

This part was developed through a model. The original was built up of hand - made parts, tested, examined and used as a prototype to aid the die caster in constructing his die. Such preliminary models, more than pay for themselves by avoiding later grief due to incomplete visualization. Actual operating stresses or conditions may be imposed to check mechanical working; also, the production engineering department or contract supplier can use it for reference.


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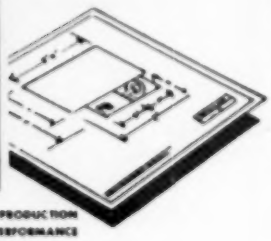

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Figure 10. Two die castings which make up the radiator valve cover are ribbed to reinforce internal pressures, and are designed also for ease of gasketing.

### 5. Radiator Valve Cover

Companion parts for a radiator valve cover, Figure 10, are aluminum die castings. The same pair of die cast housing halves are used for valves having a variety of springs for different open-to-closed range for a wide latitude in control pressures.

Both die castings, Figure 11, are built to resist air pressure

and are sealed and gasketed to be air tight up to 30 pounds pressure, although normal operating pressures range in the neighborhood of 15-17 psi. *Both castings are ribbed against internal pressure,* and the mating surfaces of the two pieces are faced to assure flat, uniform gasketing surfaces. Originally designed to be used as cast, it was soon found to be too difficult to control leakage along the gasket surface. A 1/32 inch buna gasket is employed.

Both die castings are produced in simple die cavities, and the designers have allowed ample draft angles for proper ejection. An effort is made throughout the design to indicate where draft and dimensions belong, i.e., indicating draft dimension from break of the radius inside the housing so that the maximum dimension occurs inside the housing. Base lines and references points are carefully thought out, also.

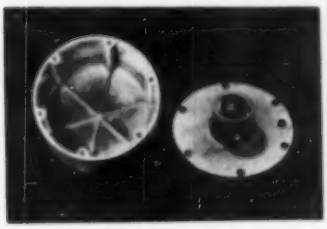

Figure 11. The two die castings used in the radiator valve cover are shown here disassembled.

## TECHNICAL SESSIONS AT ASTM MEETING

Technical discussions of the corrosion of ferrous and non-ferrous metals and spectroscopy of non-ferrous metals are among the 23 sessions scheduled to be held at the 53rd annual meeting of the American Society for Testing Materials in Atlantic City, N. J., during the week of June 26. Other sessions include fatigue testing, quality control and appearance of metals, as well as discussions on plastics, adhesives, rubber and petroleum products.

New testing and scientific equipment will also be featured. Besides improved types of physical and chemical testing instrument, newer type spectrographs, non-destructive testing equipment and equipment for stress analysis will be shown.

Adjoining the apparatus exhibit will be photographic competition in which A. S. T. M. members and member companies will display photographs related to materials, testing and research.

## DESIGNERS HOLD SEMINAR AT LEHIGH UNIVERSITY

An indication of America's manufacturing trends for the next three to five years is expected to be the result of Lehigh University's second Product Design Seminar to be held from June 26 through July 21.

Presented jointly by the Society of Industrial Designers and Lehigh University, the seminar will have as participants Walter Dorwin Teague, Henry Dreyfuss and Harold


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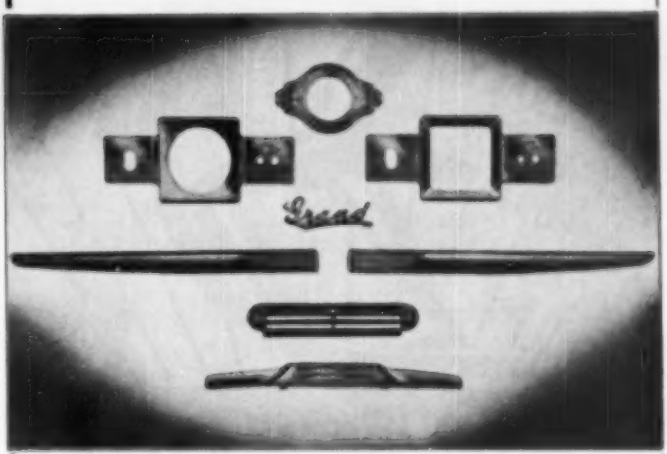


• • • All of the above are zinc alloy die castings with chrome plated finish with the exception of the flue deflector (second from bottom) which is aluminum alloy with highly polished surface. All parts are used on de luxe and standard models of Grand gas ranges.

Those castings of neat, appealing design add that finishing touch to the stove that wins customer approval.

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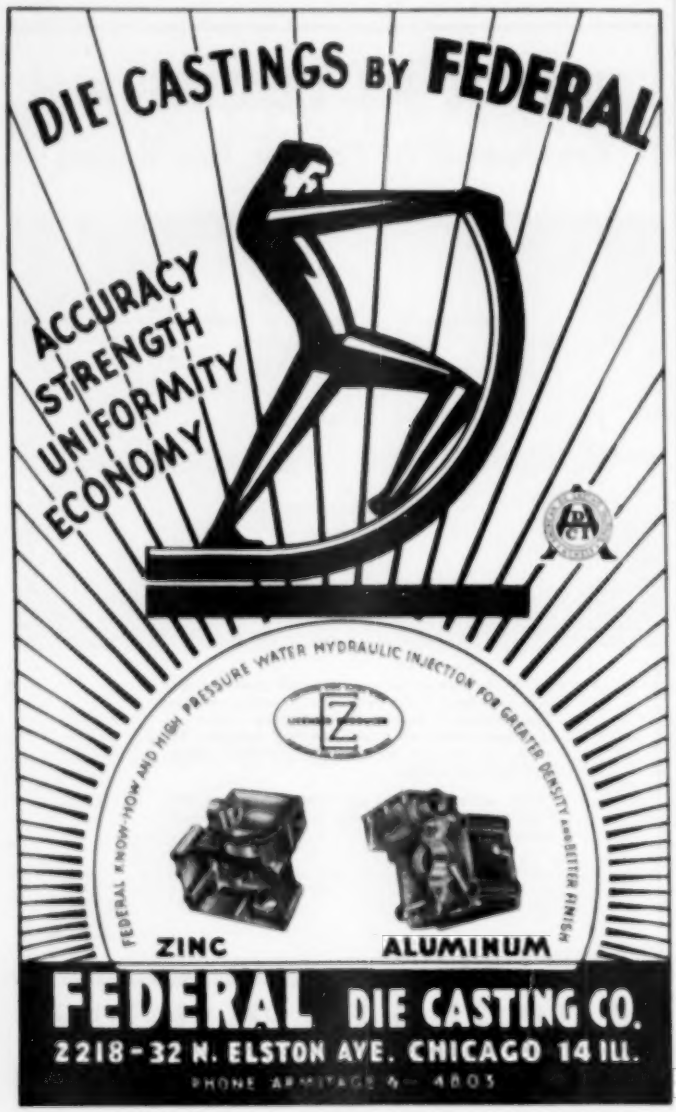
Van Doren, three leading designers. Various phases of industrial design will be discussed by 37 other speakers including leading product designers, materials specialists and production men.

Consumer research, design esthetics, material selection, production techniques, color, and design projects will be analyzed by nationally known design specialists through case studies, panel discussions and laboratory exercises.

## BEDFORD REPORTS ON DIE CAST AUTO DOORS

The increasing cost of sheet steel and labor will establish the use of die cast aluminum door frames as standard practice in the automotive industry, according to Clay Bedford, executive vice-president of the Kaiser-Frazer Corp. Mr. Bedford told members of the Detroit Chapter of the American Society of Tool Engineers at a recent meeting that these doors introduced by Kaiser-Frazer last year are now in customers' hands for trial use.

He stated that die cast doors are being produced at the rate of 100 per hour with the help of combination milling and checking fixtures used during fabrication. These fixtures check the part and undercut the molding lugs at the same time they remove flash from the door lock button hole.



## GREATER USE OF DIE CASTINGS LOWERS COST OF MACHINING, ASTE TOLD

Greater use of accurately formed die castings to eliminate machining operations on all kinds of parts was advocated at a technical session of the American Society of Tool Engineers in Philadelphia during April, by Charles Franklin, Rochester Products Division, General Motors Corporation, Rochester, New York.

Recent advances in the art of die casting, according to Franklin, have made it possible to hold closer tolerances than in the past. Holes can be "cast into" die cast parts to a size equal to that of drilled and reamed holes when produced by machining, he said. Holes as small as 0.028 inch in diameter and 5/64 inch deep have been cored successfully in thousands of parts, Franklin said.

Small tapered holes almost 3 inches deep can also be produced with relative ease, he said. Even lower production costs than formerly are now possible with die casting, Franklin claimed, pointing out that most die casting machines are now completely automatic in operation.

This has been accomplished in part by making the dies in the machine operate practically like "machines" with such moving parts as side slides, core pins, ejector pins, ejector slides, re-entry slides for ejection, cam followers, etc.

# FINISHING DIE CASTINGS

## A SECTION DEVOTED TO THE FINISHING PROCESSES

MACHINING—Most die castings require some machining operations. In this section will be found information to aid in planning and selecting the proper method and equipment for these operations.

ASSEMBLING—Die castings are generally assembled components. This section includes information on fastenings and methods for mass production assembly operations.

SURFACE FINISHING—Most die castings receive some type of surface finish such as plating, organic coating, anodic coating or chemical coating. This section contains information on the methods, processes and equipment used for the various surface finishing treatments on the die casting alloys.

Whether you use it for protection . . . or for appearance . . . here's the

# Economy Finish for Castings

**UNICHROME DIP FINISH** supplies **corrosion-resistance** to ordinary castings, **chromium-like appearance** to zinc plated ones

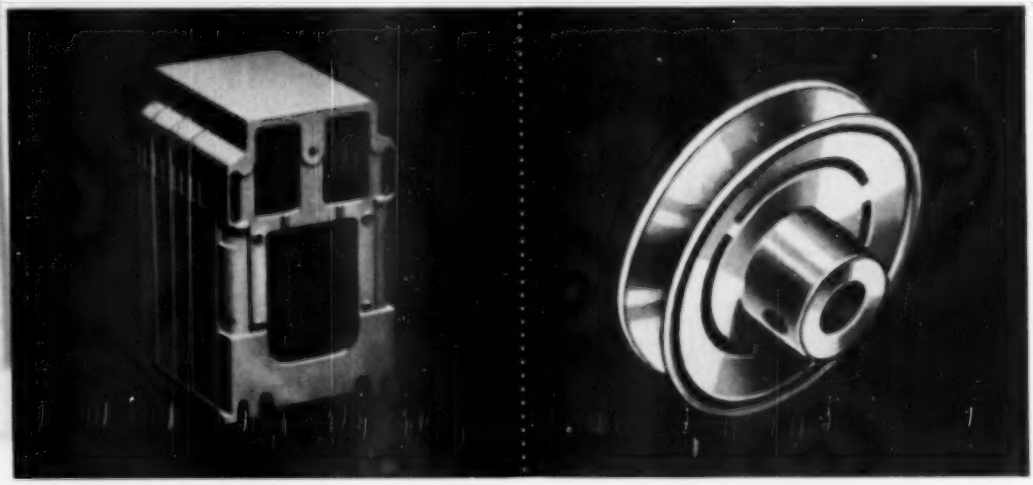
*. . . at a fraction of a penny per sq. ft.!*

What a "find" in a finish for castings — zinc plate followed by the new, bright Unichrome Dip Finish! It can be done quickly, cheaply. And as for zinc's usual drawback — its rapid dulling — that's overcome completely. For the Unichrome Dip Finish not only brightens even *ordinary* zinc plate to chromium-like luster and color, but supplies substantial protection against "white corrosion" and dulling as well! You don't have to buff the castings to assure a finish with a quality appearance out of all proportion to its low cost.

The Unichrome Dip Process is also used to chromate-treat unplated castings — for corrosion resistance or to prepare the surface for painting. And with profit! Take, for example, the case of a well known company producing automotive die castings. When they switched to Unichrome Dip Finish primarily for its corrosion resistance, they discovered they were also getting a tidy saving of over 50% of the cost of former materials!

Unichrome Dip is a chemical treatment. The finish it produces on both zinc plate and castings is integral with the zinc. Unichrome Dip Finish assures excellent adhesion of organic coatings without priming.

Write us for more information on how you can benefit from this service-proved finish.



**PROTECTION AGAINST CORROSION!** Zinc base die casting is ready to give long service without developing white corrosion after being put through the economical Unichrome Dip Process. Such a protected casting can be finished with organic coatings without priming.

**CHROMIUM-LIKE LUSTER WITH ZINC PLATE!** This die cast wheel illustrates the bright, corrosion-resisting, *durable* finish you can achieve with ordinary zinc plate. You have to actually *see* its "color" to appreciate its strong sales appeal.

**UNICHROME** Trade Mark **COATINGS for METALS**

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**A monthly digest of current technical progress selected and prepared by the editorial staff of DIE CASTINGS. This section is devoted to finishing processes for all types of die castings, and is written specifically for the benefit of the production man.**

## CHEMICAL TREATMENT OF DIE CASTINGS CONTRIBUTES TO HIGH QUALITY ORGANIC FINISHES

In considering the factor of quality in finishing die cast products, it should be remembered that present-day demands for increased corrosion resistant finishes have resulted in more durable organic coatings and improved methods for preparing surfaces to receive an acceptable type of organic finish.

Providing die cast products with a non-metallic coating of the proper texture adapted to inhibiting corrosion and increasing the adhesion of organic finishes are primary factors in their preparation for high quality finishing operations. Thus, instead of activating the metal surface, such as may result from certain cleaning and acid etching treatments, the surface is converted into a more stable and less reactive medium as a base for paint.

In many production line operations, chemical treatments are used to prepare die cast surfaces for subsequent organic coatings. However, many of these conversion coatings have a considerable degree of corrosion resistance whether coated subsequently or not.

The advantages of using chemical treatments in high quality finishing of die cast products should be fully recognized. Appearance, commercial adaptability, and general utility are factors to be considered by the production man when selecting a chemical treatment, as well as methods of application, limitations, and practical use.

*Zinc Base Die Castings*—Because of the reactive nature of zinc, it is ordinarily difficult to obtain good paint adhesion without adequate chemical treatment of the surface. Protective coatings on zinc base die castings produced by converting the surface of the metal into a chemical compound of exceedingly low solubility in the environment to which it is to be exposed are becoming of increasing importance. The reactions that take place at the metal-paint interface are recognized to have a marked effect on the adhesion of organic finishes to zinc surfaces.

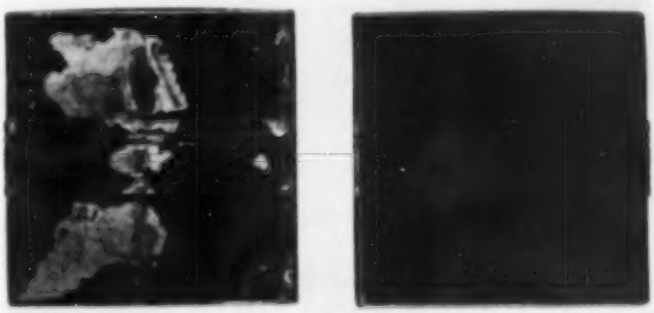
Another important function of these surface conversion coatings is to inhibit the spread of corrosion when finishes are scratched through or chipped. Several chemical treatments involving short dips, or spraying in chemical solutions, or simple electrolytic treatments are commercially available for use with zinc die castings.

The phosphating of zinc base die castings for increased paint and lacquer adherence has come into widespread use in the last few years. Such chemical treatments involve the use of phosphate solutions which are applied either by dipping, spraying or brushing. Proprietary solutions such as the Bonderite[1] process are available which produce on the surface an adherent film of zinc phosphate that is remarkably effective in improving the adhesion and adhesion retention of organic coatings.

In Figure 1 is shown the difference in paint adhesion when paint is applied over an untreated zinc base die casting and a phosphate coated die casting. Definite chipping of the organic finish is apparent on the untreated casting, while the finish is still intact over the phosphate-coated casting.

In using solutions of this type, the instructions supplied by the manufacturer should be followed. One point that has been brought out[1] is that special care should be taken that the film deposited on the parts is not excessively thick or additional coats of

**Figure 1. Chipping of organic finish on untreated zinc die casting, lower *left*, is definitely evident, while finish on phosphate-coated casting, lower *right*, is still intact.**



enamel may be necessary to satisfy the absorptive properties of the phosphate coating and ensure a finish of the desired appearance.

Several procedures have been described by which protective surface films consisting essentially of chromium salts can be produced on zinc

**Figure 2. Shown above are zinc die castings coated with a jet black coating that can be used with or without subsequent organic coatings.**

surfaces. The Cronak[1] process is a means of producing a surface conversion coating by simple immersion in a solution containing hexavalent chromium and sulfuric acid. A typical film is golden brown in color with a thickness of about 0.00002.

While it is reported that the primary use of the Cronak process is to provide protective films, such films also serve as a good base for organic coatings. One of the most widely used applications is in the case of parts on which some areas are to be protected by the film itself while others are to have decorative organic coatings. The adhesion and retention of adhesion of baking enamels to Cronak films is reported to be satisfactory with the majority of enamels, and adequate commercial experience has been reported for the combination coatings. In general, air drying finishes have been stated to adhere poorly to the Cronak film.

The Iridite dip process[2] produces an adherent conversion coating on zinc surfaces that belongs to the general class of chromated zinc coatings. It is reported[3] that chemical studies have shown that the major portion of the Iridite type coating is composed of a chrome gel compound, probably lying within the group of chrome hydroxides or hydrated chrome oxides. The essence of the coating appears to be the chromium containing compound or compounds.

The production line operations for using the Iridite treatment on zinc base die castings at the plant of Easy Washing Machine Corporation have recently been described[4]. In this application the coating is used to provide resistance to surface corrosion and also to serve as a good preparation for enameling.

In carrying out the operation, the parts are first cleaned in a commercial cleaner. A dip in running water follows immediately, after which the castings are immersed for 5 to 10 sec. in 2 per cent sulfuric acid solution to neutralize any alkali remaining. Following another water rinse, the parts are ready for immersion in the chemical treatment bath, which is prepared by mixing 1 gal. each of proprietary Iridite A and B solutions to each 10 gal. of water. The pH of the treatment bath is held below 3.1; the solution should be maintained so that the castings are given a characteristic coloration in 15 sec. For continuous operation, equal amounts of the A and B Iridite solutions are added as needed. The operating temperature of the dip bath is 85-95F. Agitation of the work or of the solution is desirable.

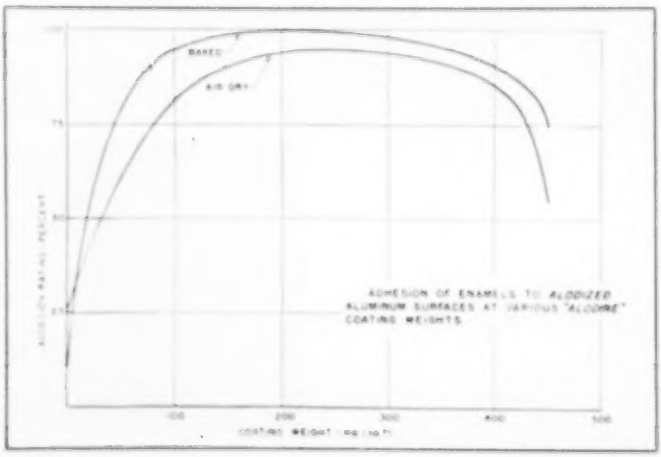
The dip treatment is followed with a cold running water rinse, then a hot water rinse, which is maintained below 160F. The large die cast parts are usually heated sufficiently by the hot water rinse to dry quickly and small castings are dumped into a centrifugal dryer. One electric hoist serves the first four tanks and another is used for the three remaining tanks and centrifugal dryer.

One feature of the set-up at Easy Washing Machine Corp. of interest to the production man is the use of automatic timers on the hoists. The first is set for the time required in the cleaner, while the second is set for the 15-sec. dip in the Iridite solution. A hinged arm at each tank is moved into position when the work basket is lowered and automatically resets the timer when the basket is raised. This arrangement avoids leaving the load in the tanks longer than intended, and eliminates the need for the operator to watch a timing clock, thus promoting uniformity.

Other proprietary treatments are available. Lithoform and Zinodine are processes of the American Chemical Paint Company that promote paint-bonding on zinc base die castings. Black Magic a proprietary process of the Mitchell-Bradford Chemical Company produces a jet black coating on zinc surfaces (See Figure 2) which is used both with and without subsequent organic coatings. Ebonol Z is a blackening process developed by the Enthone Company. This treatment is reported to be suitable for indoor exposure or, with hard drying wax or lacquer, for outdoor exposure, as well as a satisfactory undercoat for organic coatings.

Anozinc is a type of conversion coating which is formed anodically by treating zinc base die castings in a modified chromate bath with the

**Figure 3. The graph below shows that adhesion of organic finishes does not increase with the amorphous phosphate coating weight at the higher coating weight values.**



Recently, details have been given[7] of a new chemical treatment process for aluminum which is stated to produce an amorphous phosphate coating on the surface of aluminum die castings and other aluminum alloys. The process, known commercially as the Alodine process[8], consists essentially of a mixture of chromic, phosphoric, and hydrofluoric acids in certain well defined proportions[9].

The primary importance of the Alodine amorphous phosphate coating is as a paint bonding and under-paint corrosion-inhibiting coating. Figure 3 shows the results of tests conducted in the American Chemical Paint Company laboratories to determine the effect of the surface treatment process on the adhesion of typical air dried and baked enamels on aluminum parts.

In this study to determine the effect of coating weight on adhesion and the optimum coating weight for best adhesion, parts were finished with the organic finishes over amorphous phosphate coatings of various weights and subjected to adhesion tests. The adhesion tests used in the evaluation were: (1) Bell Telephone Laboratory adhesion test; (2) Impact test (1 kg-m energy); (3) Olsen cup ductility test; (4) Conical-mandrel bend test.

The data in Figure 3 shows that the adhesion of the organic finish does not increase with the amorphous phosphate coating weight at the higher coating-weight values.

Another commercial chemical treatment process for aluminum alloys developed by Allied Research Products, Inc., is known as Iridite Alcote. The process is described as a simple one dip chromate-type treatment useful with and without subsequent organic finishing. The chemical treatment improves the adhesion and durability of organic finishes on all types of aluminum products. Lyfanite is a proprietary process of the Neilson Chemical Company for surface treatment of aluminum alloys.

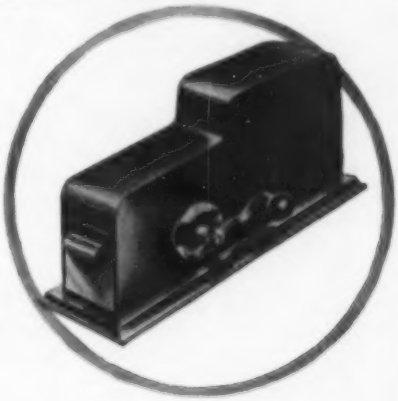
*Magnesium, Copper, Brass, and Lead*—Chromate films formed on magnesium alloy die castings by immersion in acid baths containing dichromates or mixtures of dichromates and other salts are used to provide a base to which paint will have good adhesion.

Copper, brass and lead are sometimes treated to convert their surfaces to an oxalate-type coating.

One commercial process is known as the Loxal process[10]. Typical of an example in the improvement in adhesion which has been cited[11] for this treatment is that of two coats of baked black enamel over untreated and oxalate coated yellow brass, each subjected to salt spray test in which only $\frac{1}{4}$ inch paint creepage occurred from a given scratch through the paint finish after 1340 hours test on the oxalate coated specimens compared to $\frac{1}{4}$ inch creepage on the untreated specimens at 577 hours. Considerable experience was obtained during the war on the application of paint over oxalate coated lead to improve its adhesion and durability.

A large number of oxidized or surface conversion finishes can be applied to copper base alloys. Black sulfide coatings are formed by immersion in aqueous sulfide solutions. Frequently black oxide coatings are specified on brass as paint bases where better paint adhesion and surface life


An Ounce of ZAPON Is Worth a Pound of Cure . . .



ONCE the wrong finish has disrupted your whole production line, irritated you and your customers, and piled up costs and rejects, finding a remedy can be a tough, frenzied task.

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than obtainable on unpainted brass are required". Ebonol-C" is a proprietary process of the Enthone Company for producing a durable black cupric oxide coating on copper and copper alloys by a simple dip procedure.

[1] Proprietary Process Parker Rust-Proof Company, Detroit, Mich.
[2] See also "The Finishing of Zinc Alloy Die Castings"—Published by the New Jersey Zinc Company.
[3] U. S. Patent 2,035,180. Application for license and for full details of the process should be addressed to the New Jersey Zinc Company, 160 Front Street, New York, N. Y.
[4] Proprietary Process of Allied Research Products, Inc., Baltimore, Md.
[5] Taylor, *Proc. Am. Electroplaters' Soc.*, (1944).
[6] Reported in *The Iron Age* (Feb. 9, 1950).
[7] Storch, *Proc. Am. Electroplaters' Soc.*, (1944).
[8] Wray, *Aviation*, 40, 83 (1941); also U.S.P. 1,946, 152—Edwards.
[9] Edwards, *The Monthly Review*, 26, 513 (1919).
[10] See also *The Corrosion Handbook*, P. 861, John Wiley & Sons (1948).
[11] Gibson & Russell, *Ind. Eng. Chem.*, (Dec., 1946).
[12] Douty and Sprunance, *Proc. Am. Electroplaters' Soc.*, (1949).
[13] Process of the American Chemical Paint Co., Ambler, Pa.
[14] U.S.P. 2,418,877 gives the operative ranges of the solutions.
[15] Registered trade mark of the Parker Rustproof Company.
[16] Dorsey, *Proc. Am. Electroplaters' Soc.* (1946).
[17] Blatnwis, *Product Engineering* (Oct. 1949).
[18] U.S.P. 2,366,991.


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### TINNERMAN OPENS OFFICE TO SERVE CENTRAL STATES

Opening of a district office in St. Louis by Tinnerman Products, Inc., has been announced in Cleveland by H. R. Russell, general sales manager of the firm that makes the Speed Nut fasteners. At the same time Mr. Russell revealed that Carl F. Marcussen, formerly with the Tinnerman Chicago office, has been named manager of the new district.

### ATLAS PROMOTES BLACKETER

Charles W. Blacketer has been appointed technical director of the Stamford, Conn., branch of Atlas Powder Company's industrial finishes department, according to G. B. Work, general manager. Guido Ariotti succeeds Mr. Blacketer as manager of the customer service department.

Mr. Blacketer came to the company last year after extensive experience with Berry Bros., Sherwin-Williams and Diamond Alkali Co. Mr. Ariotti completed 25 years service with Atlas last year. He has specialized in laboratory and field service on all types of product finishes.

### BOYCE RE-ELECTED

Fred C. Boyce was re-elected president of D. J. Murray Manufacturing Company, Wausau, Wisconsin, at the directors meeting following the annual stockholders meeting. The following officers were re-elected for the ensuing year: M. P. McCullough, vice-president; C. E. Staky, executive vice-president and general manager; G. L. Ruder, treasurer; A. W. Plier, secretary and assistant manager; C. L. Durkee, vice-president in charge of sales of pulp and paper mill equipment.

# Tapping Increased From 20 to 125 Parts Per Hour With Multiple Spindle Head

TAPPING internal threads is one of the most common machining operations performed on die cast parts because the difficulty of casting them usually makes it more economical to perform a tapping operation. The fact that holes can be cored accurately with regard to both size and location, whether in the plane of the die parting or at an angle, makes it feasible to specify holes close enough to finish tolerance so that they need no drilling or reaming prior to tapping.

By using a multiple spindle tapping head, Figure 1, on a standard drill press, the manufacturer of die cast parts can effect further economies without sacrificing accuracy.

In the case of the die cast part shown in Figure 2 use of the multiple spindle tapping head increased production to 125 parts per hour in comparison with the single spindle box jig method that produced 20 parts per hour. The spindle head uses a spindle speed of 1,000 rpm.

### Six Holes

In this part six holes are tapped, three in each of two different faces as indicated by arrows. The six holes are formed by movable cores. One part is placed in Position A and three holes tapped. It is then placed in Position B with the other face up and another part is placed in Position A. Both parts are then tapped simultaneously, three holes in each part. From there on, the sequence continues with six holes being tapped at each stroke of the press. At each stroke one part is finished.

The part is held in a work holder consisting of two simple horns mounted on a standard bed plate. The parts are placed on these horns and are then automatically positioned and held by locator rods "C" when the head is lowered. All components of this unit are tied together like a punch and die, maintaining the inbuilt accuracy and lineup.

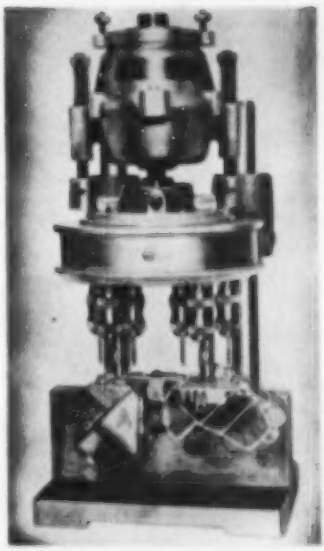


Figure 1. The Erco-Emrick multiple spindle tapping head, top right, is used to increase speed and efficiency of tapping operations on die cast parts. The accuracy with which holes can be cored does away with need for preliminary drilling or reaming.

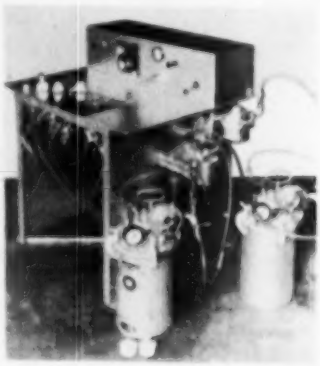
Figure 2. Once tapping sequence has been started, bottom right, six holes are tapped at each stroke of the press, three in each part. At each stroke one part is finished.

# NEW PRODUCTS

**For additional information on the products appearing on this and the following pages, mark the key number of the item on the card bound into this issue. Drop the card in the mail—no postage is required.**

## DECORATING MACHINE SPRAYS 3,600 PIECES PER HOUR

An automatic air-operated machine for spray decorating small metal and plastic parts on a mass production basis has been developed by the Conforming Matrix Corp., Toledo, Ohio. Parts can



be processed at rates ranging from 700 to 3,600 pieces per hour.

A conveyor belt permits operator's use of both hands for loading; a paint regulator insures equal application of paint on each part processed. Eight AGA DeVilbiss automatic guns and two 2-gallon air-agitated paint pressure tanks with four insert containers are employed by the sprayer.

For additional information circle No. 1 on the attached card.

## AIR FEED PROVIDES CORRECT DRILLING ACTION

Production of automatic air power feeds that will provide proper thrust and correct drilling action for small drill presses has been announced by the Beckett-Harcum Co. of Wilmington, Ohio. The air feed features instant reversal of thrust on breakthrough, elimination of hydraulic checking devices for light work, depth control accuracy of 0.001, tapping of threads without using a tapping head, and a variable stroke speed.

The Beckett automatic feed is available in either standard or heavy duty models in four feed types. Models are designed to fit all presses having 1¼ inch pinion shafts and can be adapted to shafts of other sizes. Standard models have a maximum stroke length of 2½ inches and develop from 4 to 750 lbs. drill point thrust. Heavy duty feeds have a maximum stroke length of 4 inches and develop from 10 to 1250 lbs. drill point thrust.

For additional information circle No. 2 on the attached card.

## SOLDER FOR ALUMINUM

Force solder made by the Farrelloy Co. of Philadelphia, Pa., can be used on aluminum and all other metals, including stainless steel, inconel and monel metals. The solder is non-reactive and is claimed to have a high degree of resistance to atmospheric, alkaline and acid corrosion. It is extruded in ⅛ inch wire and wound on spools. It is molten at 435F.

For additional information circle No. 3 on the attached card.

## CENTER FINDER DOUBLES AS DIAL INDICATOR

A new dial center finder for locating work pieces on jig borers, milling machines, radial drills and lathes has been developed by the Waltham Dial Gauge Co. The indicator can be used to indicate externally or from a hole in the workpiece.

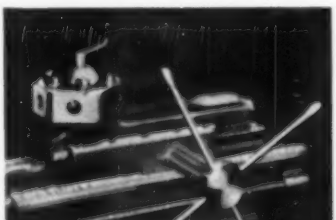
The dial is attached with a friction fit that allows turning for convenient reading and may be detached for use as a regular dial gauge indicator with a range of .100.

For additional information circle No. 4 on the attached card.

CIRCLE NUMBERS ON THE CARD AND MAIL!

## TURRET ATTACHMENT FOR LATHES GIVES MULTIPLE TOOL USAGE

The South Bend Lathe Works is now producing a hand feed turnstile-operated bed turret as an accessory for its 16" swing lathes. The turret was designed to permit multiple tool usage on repetitive



operations. The turret head may be back-indexed or spun to skip tool positions. A crank-type binder lever is provided for locking the turret head at any point along the usable length of the lathe bed.

The head to be bored by user takes six standard turret tools with 1½ inch diameter shanks. The effective feed of the turret slide is

(Continued on Page 12)

## How to make planned assembly savings pay off

*SAVING 25%—STRONGER FASTENINGS. Durant Mfg. Co. uses several P-K products to advantage in their Productimeter. Four Type F Self-tapping Screws fasten the mounting plate to the cover frame, two Phillips Recessed Head P-K Type Z Screws fasten the cover to counter frame, and another fastens the spring to the counter arm. The manufacturer says, "Only with P-K Screws could we get the simpler, speedier, stronger fastenings we wanted." Wing Nut on end and Set Screw in arm are also P-K. Find out how you can make similar savings. Talk to a P-K Assembly Engineer.*

## Don't let screw failure cancel savings

TYPE F
(Also made with Phillips head)

Three steps are needed to *insure* assembly savings. First, engineer your assembly for minimum cost. Next, select the simplest, speediest fastening method. Then, if as in most cases, you find this to be with Self-tapping Screws, use the best that money can buy. For, if screws run offsize, if they break or otherwise fail, all your carefully *planned* savings are lost.

## Choose P-K Screws ... avoid slowdowns and scrapped parts

**NEED SPECIAL SMALL SIZE SELF-TAPPING SCREWS WITH PHILLIPS RECESSED HEADS?**

P-K Type A or Z, in No. 0 or No. 1 diameter, with a No. 0 Phillips Recess, can be made to order, quantity permitting.

Parker-Kalon, originators of Self-tapping Screws, learned long ago how to keep hardness and toughness properly balanced in every screw—learned to maintain the uniform quality that keeps assembly humming. And there's no substitute for 35 years experience.

Remember, the actual cost of screws depends, never on price, *always* on performance. Specify Parker-Kalon, and you'll see why the makers of thousands of the nation's best known products say—IF IT'S P-K . . . IT'S O. K.!

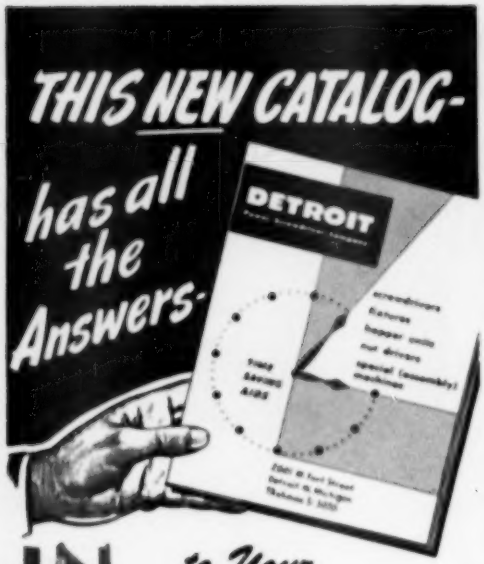
**NEW FOLDER ON FASTENINGS TO DIE CASTINGS.** Free on request. Ask for Form 449. Parker-Kalon Corporation, 200 Varick St., New York 14, N. Y. Parker-Kalon Screws are sold everywhere through accredited Distributors.

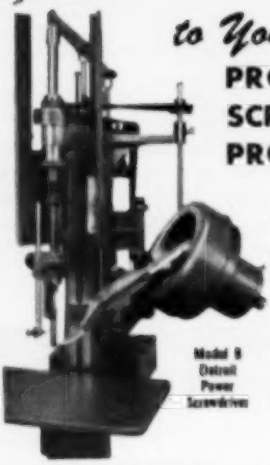
*TRADE MARKS REG. U.S. PAT. OFF.

P-K
TRADE MARK

*The Original*
**PARKER-KALON® SELF-TAPPING SCREWS**

A TYPE AND SIZE FOR EVERY METAL AND PLASTIC ASSEMBLY



to Your
PRODUCTION SCREWDRIVING PROBLEMS

Model B Detroit Power Screwdriver

It's alive with illustrations and descriptions of invaluable time-saving aids: **POWER SCREWDRIVERS** that drive all types of screws as fast as one a second, without stripping of threads or marring of heads, all driven to uniform tension, 3 models . . . **Also Fixtures, Nut Drivers, Hopper Units and Special Assembly Machines.** Modern necessities that will materially cut production costs.

## MOTORIZED HOPPER UNITS

Sturdy efficient machines, easily adapted to Presses, Centerless Grinders, Thread Rolling and Slotting Machines or Special Machines. They will feed Screws, Screw Blanks, Rivets, Pins, Discs, Nuts, Bearing Rollers, Steel Balls, Washers and miscellaneous items. 6 sizes: 8", 10", 12", 16", 24" and 30" diameters.

*Mail Coupon for Catalog*

**DETROIT POWER SCREWDRIVER CO.**
2821 West Fort St., Detroit 16, Michigan

Yes, send along your new catalog . . . sounds interesting.

COMPANY NAME _____

STREET ADDRESS _____

CITY _____ STATE _____


*(Continued from Page 50)*

6⅛ inches. When properly installed the head will index to ± .0005, measured four inches from the turret face.

For additional information circle No. 5 on the attached card.

## TRANSFER-TYPE MACHINE PRINTS ON NON-POROUS SURFACES

Printing on almost any round, flat, concave or convex non-porous surface can be done by a transfer-type machine developed by Apex Machine Manufacturing Corp.

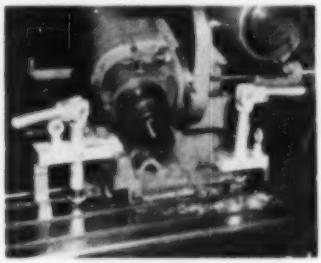
Impressions of type, line cuts or electros are made on a smooth-surfaced transfer pad with a flexible cushion. The impression is picked up by pressing the items to be marked against the pad, or by rolling it by hand.

For additional information circle No. 6 on the attached card.

## MECHANICALLY LOCKING CLAMP HAS FOUR-INCH CAPACITY

A mechanically locking clamp made of cadmium plated, hardened alloy steel can be used to increase efficiency of production machining operations on metal, wood, and plastic products. It is made by the Hoper Clamp Co.

The clamp has a capacity of four inches and a clamping bar that



holds operations at any point of contact. These features make it possible to handle a number of operations without changing the set up, saving non-productive time.

When setting up, the clamping bar is brought to rest on the operation and locked. A series of teeth on a cam is turned to mesh with the serrations on the locking post. From then on each operation is locked by the cam clamp handle. Released, a spring opens the clamp instantly for unloading and reloading.

For additional information circle No. 7 on the attached card.

## PORTABLE BLAST CABINET CLEANS DIES AND TOOLS

Designed for the abrasive blast cleaning of dies and tools, as well as castings and welding casements, a portable bench blast cabinet has been developed by the W. W. Sly Manufacturing Co. The machine operates on compressed air supplied by a standard 5 HP, 2-stage garage compressor.

For additional information circle No. 8 on the attached card.

## WETTING AGENT SIMPLIFIES DI-PHASE METAL CLEANING METHOD

The addition of a new wetting agent to chlorinated solvents is reported to make possible a simplified di-phase method for cleaning metals. Made by the Glyco Products Co., the agent, identified as

### READER SERVICE

For your convenience, all literature, samples and services offered by advertisers in this issue are listed beginning on page 4. Any of those items may be obtained by circling the proper number on the card.

S-556U, acts as an organic solvent wetting agent in di-phase cleaners in which water and solvent remain as separate layer due to differences in specific gravity.

Cleaning by this system is done by dipping the metal parts through

*(Continued on Page 54)*

# "Buffing Compound Removal was a Tough Job!!!"

● That's the title of the booklet describing in detail Cowles' remarkable new companion products designed especially for removal of buffing compounds from die castings.

Cowles SO Cleaner has superior penetrating and wetting action quickly to loosen ground-in dirt and impacted buffing compounds. SO can be used in still tank, fully and semi-automatic machines and is compatible with a wide range of temperatures. Because SO produces stable emulsions at low concentrations, it assures thorough rinsing.

Cowles ZN Cleaner effectively removes these stubborn soils in the electrolytic tanks. ZN is an alkaline cleaner formulated with synthetic detergents and sequestrants to assure optimum detergent potential under all water conditions.

Here is a combination for loosening and removing buffing compounds *which really works!*

**COWLES CHEMICAL COMPANY**
**METAL CLEANER DEPARTMENT**
**7016 Euclid Avenue · Cleveland 3, Ohio**

***The Booklet*** gives you complete information—send for it today. The coupon is for your convenience.

**COWLES CHEMICAL COMPANY**
7016 Euclid Avenue
Cleveland 3, Ohio

Please send me your folder "Buffing Compound Removal was a Tough Job!!!"

Name _____

Company _____

Address _____

City _____ Zone _____ State _____

the water layer into the solvent and then within a short time bringing them up through the water layer with minimum agitation.

For additional information circle No. 9 on the attached card.

## MACHINE PRINTS NUMBERS ON COUNTER WHEELS; HAS CONTROLLED DWELL TIME

A machine that prints numbers on the peripheral face of counter wheels, speedometer and indicator wheel has been marketed by the Acromark Co. It is claimed to print 9 to 12 printed wheels per

minute when hand operated and when motor driven to print at the operator's ability to feed.

The machine features controlled imprints secured by gearing the printing roll to the mandrel that hold the wheels to be printed. It also has controlled dwell time that permits removal of the printed wheel and the loading of another.

For additional information circle No. 10 on the attached card.

## FAST-DRYING ENAMEL CUTS FINISHING TIME

A fast-drying enamel that is said to reduce finishing time and cut storage requirements has been developed by the United Lacquer Manufacturing Corp. of Linden, N. J. Known as Base Y 2054, the new synthetic protective coating provides the hardness of a baked-on synthetic, but air dries as fast as lacquer. Products finished with the synthetic may be handled and stacked within 15 minutes and packed in three to four hours.

The enamel is claimed to offer tougher film and resistance to alkalis, fats, greases and smoke. It can be used on wood, metal or fiber products and can be polished to a hard gloss.

For additional information circle No. 11 on the attached card.

CIRCLE NUMBERS ON THE CARD AND MAIL!

## SPINDLE STAND HAS 3-WAY ADJUSTABILITY

A new adjustable spindle stand for finishing and polishing work has been developed by the Vonnegut Moulder Corp. The stand's motor can be turned to point the spindle straight up, straight down and through all the 180° between these extremes. It has 20 inches of vertical adjustment and also 5 inches adjustment lengthwise on the spindle.

With this three-way combination of adjustments a head can be brought into proper relocation with any surface of any pattern when the spindle stand is located next to a feed bed or table on which work pieces are being advanced.

For additional information circle No. 12 on the attached card.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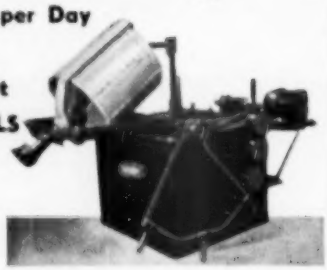

*Here is why:*

- No overhead devices—no extra construction or pulleys
- Counter-balanced side arm enables operator to handle work quickly, easily • No waste motion for loading • Single motion for unloading • Made in sizes to fit customer's needs.

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WHAT'S THE FASTEST WAY TO CLEAN METAL? See page 11

WHAT'S THE MOST ECONOMICAL WAY? See page 9

Oakite's New FREE Booklet

"Some good things to know about Metal Cleaning"

answers many questions that mean better production, more profit for you. Just look at the table of contents:

- Tank cleaning methods
- Machine cleaning methods
- Electrocleaning steel
- Electrocleaning nonferrous metals
- Pickling, deoxidizing, bright dipping
- Pre-paint treatment in machines, in tanks and by hand
- Paint-stripping
- Steam-detergent cleaning
- Barrel cleaning
- Burnishing
- Better cleaning in hard-water areas
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- Machining and grinding

FREE For this 44-page illustrated booklet, write Oakite Products, Inc., 34G Thames St., New York 6, N. Y.

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OAKITE SPECIALIZED INDUSTRIAL CLEANING MATERIALS • METHODS • SERVICE

# ALUMINUM INDUSTRY HAILS NEW, LOW COST FINISHING PROCESS

## Aluminum fabricators say IRIDITE® AL-COAT fills long-sought need for non-electrolytic corrosion resistant coating

Now you can apply a clear protective Iridite film to mill or buffed aluminum surfaces in as little as 10 seconds . . . without changing the appearance of the metal. Or, a highly protective yellow colored film can be produced from a one to two minute immersion.

Since its introduction, Iridite Al-Coat has been widely acclaimed for its ease and speed of application, superior corrosion resistance and low cost. Because of its simple operation, Iridite Al-Coat is replacing more complicated and expensive electrolytic processes for providing a corrosion resistant final finish or paint base for aluminum surfaces.

Write or wire direct, or ask your Iridite representative for full information and samples. Or, send us a sample of your product for test processing.

### *Here's Why It's Best For You . . .*

**APPLICATION** — *Dip, spray or brush* . . . **ONE SOLUTION** — *No heat or current — single dip* . . . **FAST PRODUCTION** — *Few seconds to 2 minute immersion* . . . **CORROSION RESISTANCE** — *Up to 1,000 hours salt spray on wrought stock, 250 hours on castings. Meets all military specifications* . . . **ABRASION RESISTANCE** — *No flaking or peeling from buffing, bending or stamping* . . . **PAINT BASE** — *Blocks underfilm corrosion* . . . **APPEARANCE** — *Color selection — clear or yellow* . . . **WELDABILITY** — *Can be spot welded, aids shielded-arc welding* . . . **CONDUCTIVITY** — *Low surface electrical resistance* . . . **LOW COST** — *SAVES UP TO 50% OVER OTHER PROCESSES*

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***MANUFACTURERS OF IRIDITE FINISHES FOR CORROSION RESISTANCE AND PAINT SYSTEMS FOR NON-FERROUS METALS; ARP PLATING CHEMICALS***

# USEFUL LITERATURE

**For additional information on the products appearing on this and the following pages, mark the key number of the item on the card bound into this issue. Drop the *card* in the mail—no postage is required.**

### 25 PRE-PAINT METAL CLEANER:

A new pre-paint metal-cleaning material, Compound No. 33, that removes oil and rust and prepares metals for paint in a single operation is described in a service report issued by Oakite Products, Inc. The compound is described as being effective in removing industrial soils, as well as preparing parts for painting by forming a film of phosphate on aluminum or ferrous metals to which paint will readily adhere.

### 26 DIAMOND TURNER ADJUSTED TO THREE RANGES OF DEGREES:

An illustrated brochure on a new hydraulic diamond turner is offered by the Cleveland Industrial Tool Co. The brochure demonstrates graphically how the Citco diamond turner can aid in cutting diamond and grinding costs and explains its adjustability to three ranges of degrees.

### 27 SIMPLIFIED ABRASIVE PRICE LIST:

A simplified price list of abrasive belts, rolls, discs, sheets and lapping compounds is available from the Michigan Abrasives Co. The list describes the company's Red Coat brand of surface-coated abrasives.

### 28 BRONZE BEARINGS ARE OIL RETAINING:

Bearing stock list No. 3 from the Bound Brook Oil-less Bearing Co. describes the company's line of "Compo" oil-retaining porous bronze bearings. Standard sizes in stock for immediate delivery are listed.

### 29 NEW SOUTH BEND LATHE SERIES:

A series of Light Ten lathes by the South Bend Lathe Works is described in 8-page illustrated Catalog L-10. Complete specifications, prices and attachments and accessories are listed for four models of the new lathe.

### 30 COLOR CARD ILLUSTRATES FLOCK SHADES:

Twenty stock shades of rayon, cotton and wool flock are illustrated on a color card offered by the Claremont Waste Mfg. Co.

### 31 EXTRACTORS PURIFY COMPRESSED AIR:

Oil and water extractors made by the Binks Manufacturing Co. are described in a bulletin available from the company. The extractors are used to purify compressed air before it reaches spray guns.

### 32 NON-RUSTING ALUMINUM FASTENERS:

Aluminum fastening devices made by the Aluminum Company of America are described in a complete catalog. Listed are screws, bolts, nuts, washers, rivets and cotter pins.

### 33 PRODUCTION TOOLING:

Examples of precision work done by special types of milling, broaching and grinding machines are cited in "Engineering for Production," an illustrated 8-page folder released by the Cincinnati Milling and Grinding Machine Co.

### 34 CATALOG OF MILLS AND CUTTERS:

Complete listings of mills, countersinks, deburring tools and miscellaneous cutters are listed and priced in Catalog No. 18 from Severance Tool Industries of Saginaw, Mich. The booklet suggests uses for the tools described and contains pertinent technical information on them.

**CIRCLE NUMBERS ON THE CARD AND MAIL!**

### 35 NEW HAMMERED-TYPE FINISH:

Full details, including a visualizing kit with actual finish samples are offered by the Sherwin-Williams Co. to introduce Dimenso, a one-coat hammered finish that has a two-color, three dimensional effect. The finish comes in air-drying lacquers and synthetic baking types.

### 36 FINISHES FOR ZINC AND STEEL:

Azrel, Inc., offers a series of technical bulletins on its products for protecting and decorating zinc or steel surfaces. Offered are 46 pages of detailed data on finish and plate characteristics.

### 37 INFORMATION ON CLEANING AND PROCESSING ALUMINUM:

Information on Permag cleaning and processing materials is indexed in a booklet offered by the Magnuson Products Corp. to assist those who have to deal with fabrication and maintenance of aluminum surfaces. "Permag for Aluminum Cleaning and Processing" lists new materials and methods which cover hot tank immersion, metal washing machine cleaning, steam and solvent cleaning, stripping and cleaning before anodizing.

### 38 NON-MARRING SYNTHETIC ENAMEL

A new synthetic enamel that features resistance to marring and chipping is described in literature available from the Monsanto Chemical Co. The enamel offers a high gloss and needs only a short baking cycle.

*(Continued on Page 57)*

**39 DRILL AND TAP CHUCKS:**

Drill and tap chucks and center drill drivers manufactured by the Scully-Jones Co. are described and illustrated in an 8-page bulletin, No. 1-50.

**40 POCKET-SIZE BUFFING COMPOUND GUIDE:**

To help purchasers of buffing and polishing compounds, the Mosher Co. of Chicopee, Mass., is offering a pocket-size guide which suggests uses of its products and lists services of the company.

**41 MECHANICALLY AND ELECTRICALLY-OPERATED FEED TABLES:**

Information on how mechanically and electrically operated feed tables can increase feeding speed of work pieces to machine tools and lower costs is offered in Booklet T-25, an 8-page illustrated booklet from Bellows Co.

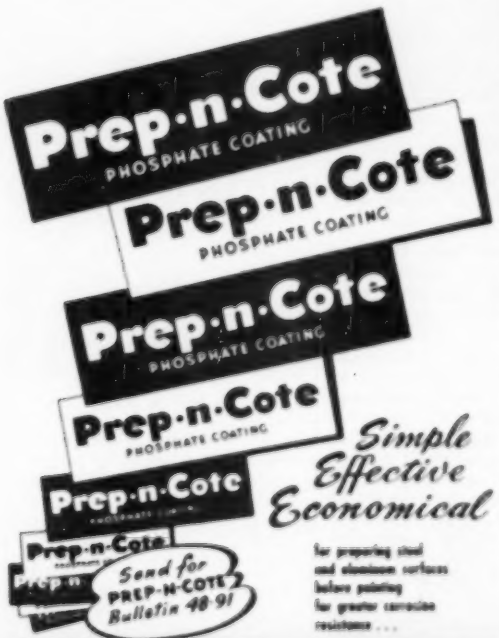
**42 LOCKING PIN CATALOG:**

An assembly device that performs the functions of taper pins, keys, set screws, cotter pins and rivets is described in a 16-page brochure from the Driv-Lok Pin Co. The folder is entitled, "Driv-Lok—The Pin That Locks."

**43 MACHINE SHOP TIME SAVERS:**

How J. S. Tool Co. products can reduce machining time is explained in an 8-page illustrated folder. Entitled "Machine Shop Time Savers," the booklet describes the use of dressing and cutting tools, vise jaws, parallels and jaw clamps.

*(Continued on Page 72)*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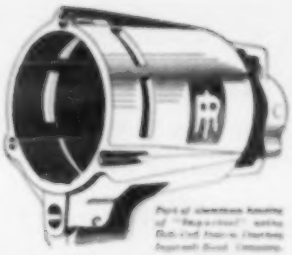
Windsor, Ont. 6563 Benson St., Detroit 7, Mich. Los Angeles, Cal.



# HOW TO MAKE BETTER... CHEAPER DIE CASTINGS

It is easy to simplify design and effect impressive economies in all die castings by the use of Heli-Coil® Screw-Thread Inserts.

These precision-formed threads of stainless steel or phosphor bronze wire offer these major advantages:

1. They add great strength to the threads in the parent metal . . . permitting smaller thread holes and reduction in boss size.
2. They provide permanent, positive thread protection . . . prevent damage from high torque and vibration.
3. They eliminate corrosion, galling and seizure.

Simple addition of these 3 advantages equals . . . better end product . . . less field service . . . complete customer satisfaction.

Heli-Coil Inserts fit all National Coarse and Fine Thread Series . . . also spark plug and pipe thread sizes. They meet all specifications for military, industrial, automotive and aviation use.

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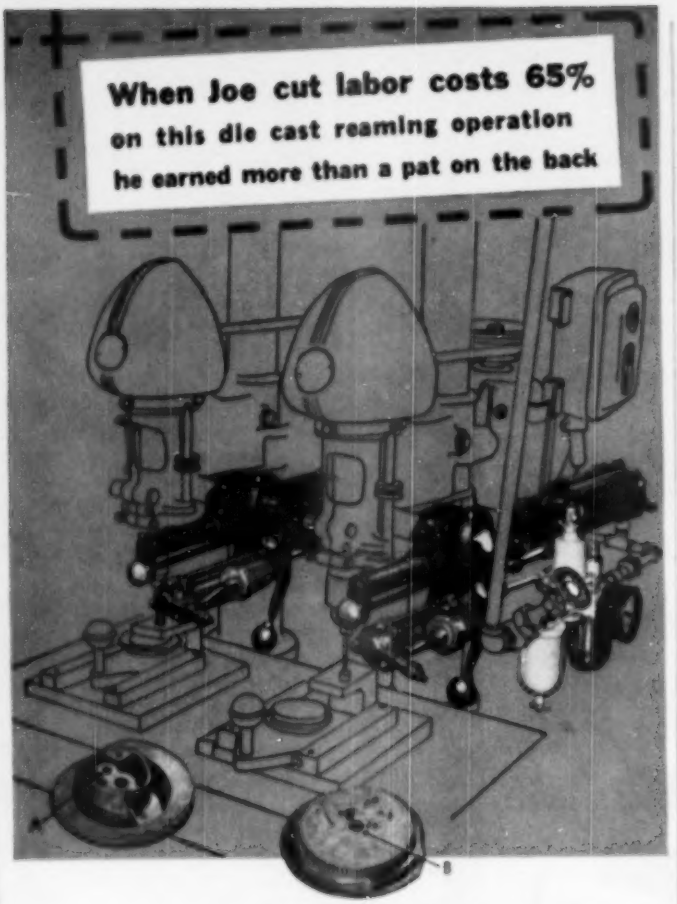



**THE JOB:** Finish ream two holes in a zinc die cast record changer part. Hole "A" on one side of the part, hole "B" on the reverse side.

**JOE'S SOLUTION:** He equipped two 14" drill presses with Bellows "Controlled-Air-Power" Feeds and Hydro-Checks; installed a two-position fixture (load and unload in the front position, ream in the back position.)

**THE RESULT:** Labor costs cut 65%.

LIKE TO KNOW HOW JOE DID IT?

● That's what alert production men like about Bellows "Controlled-Air-Power" Devices. They spark imagination; set the old creative bug working; give an engineer ideas . . . and, equally important, help him put them to practical, profitable use.

Bellows "Controlled-Air-Power" Devices (air motors, air-powered work and tool feeds, air-operated rotary work feed tables, air-powered work holding and clamping units) convert standard hand-operated machine tools to automatic units, make tool-room built special purpose machines practical and inexpensive even for short runs.

Write for Form Facts File 66-196. We'll send it, without cost or obligation, along with many other similar factual stories . . . full of ideas you can use to cut costs on secondary die cast operations. *Address: Dept. DC 650.*

The Bellows Co.
AKRON, OHIO


## ELECTROPLATERS DISCUSS FINISHING COSTS

Technical sessions on means of reducing finishing costs will be a feature at the 37th annual convention of the American Electroplaters' Society to be held at the Hotel Statler in Boston, Mass., June 12 to 15. The convention will also be the Fourth International Conference on Electrodeposition in collaboration with the Electrodepositors' Technical Society of Great Britain.

Two sessions on smoothing and levelling processes in electroplating will be held at which leaders in the relatively new field will report and discuss their most recent findings.

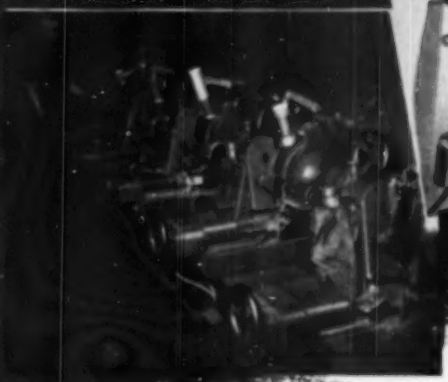
## SEVERANCE APPOINTS NEW SALES MANAGER

Robert S. Cave has been named general sales manager of Severance Tool Industries, Inc., Saginaw, Michigan, manufacturers of mills, countersinks and other cutting tools. Mr. Cave started with Severance in November, 1940. Besides serving as machine operator and supervising production departments, he had served as field sales engineer and assistant sales manager.

Robert S. Cave

Prior to joining Severance Mr. Cave was employed by the Bay City Division of Electric Auto-Lite, serving two years in the nickel and chrome finishing department and two years in the automatic screw machine department.

# Save 5 Ways and get BETTER BUFFING



## Appli-matics Apply Buffing Compounds AUTOMATICALLY with the EXPERT'S TOUCH

**SAVE BUFFS**—The NEW Vander Wal-Wagner Appli-matic reduce wear on buffs caused by too little or too much compound. Foot-treadle or knee-lever control of air-trip enables operator to determine intervals and amount of compound as work progresses. Ideal for polishing lathe or automatic.

**SAVE LABOR**—Buffing compound is applied without interruption of work. Loading of receptacles takes only two seconds—without stopping machine. Full time wheel tender not required, yet Appli-matics permit application to each wheel independently of others in a multiple set-up.

**SAVE COMPOUND**—Appli-matics' receptacles grip your bar right down to the "nubbin" with safety, eliminate waste from overloading, too. A touch of the operator's toe or knee actuates application, by gravity alone, of the correct amount of compound he needs to build a good "face" on the buff.

**SIMPLIFY INSTALLATION**—Any mechanic can install Appli-matics with simple tools. Brackets are universally adjustable to apply to any spot on the wheel. Low-pressure air line permits use of plain hose for flexibility. There are no electrical connections or fine adjustments.

**SIMPLIFY MAINTENANCE**—The only actuating power is gravity, hence there are no complicated motors, gears, switches or other mechanisms demanding frequent attention. The small air-cylinder which trips the counter-balance requires no lubrication. Appli-matics are bronze bushed throughout for long life.

**PRODUCE SUPERIOR WORK**—You get all the desirable results of costly hand application. Your operator uses his training, skill and judgment to build a good "face," applies compounds at any time or at any work position in com-operated automatics, thus avoids loading of the work. Your "too much or too little" problem is solved. For complete information, see your Wagner representative or send for new bulletin.

**Wagner BROTHERS INC.**

Wagner Bros., Inc., 404 Midland, Detroit 3, Michigan

Send ☐ APPLI-MATIC Bulletin

☐ Name of representative in my area

Name _____ Title _____

Firm _____

Address _____

City _____ Zone _____ State _____

## SPEAKING OF LIGHT WEIGHT

(Continued from Page 21)

gear housings and a large number of mounting bosses cast integral with it, it weighs only one pound. This part serves as a mounting frame for all mechanical components of the "Tycoon," for the recording and playback arms, for the optical indexing system and for the electric motor which furnishes the drive to the turntable and to the recording and playback arms.

The purely electrical and electronic components, such as control relays, volume controls, selector switches and amplifier system are mounted on a separate stamped chassis plate, which also serves as the bottom enclosure. The major part of the electronic amplifier, employing sub-miniature tubes is mounted on a removable plastic card which plugs into contact pins on the chassis plate assembly. This arrangement makes it possible to separate mechanical and electronic assembly completely, with consequent advantages in production and in the inspection and testing of these elements prior to final assembly.

The following requirements had to be met in the design of the main frame:

1. Ample rigidity to provide firm support for all mechanical parts and for the electric motor, and to maintain close tolerances in machining.

2. Provision for all necessary bosses, mounting surfaces and gear housings as an integral unit.

3. Completely sealed-in construction for all gearing and rotating shafts, with permanent lubrication.

4. Good machinability.

5. Minimum weight.

Requirements 1, 2 and 3 dictated the choice of a die casting in preference to other production methods, while requirements 4 and 5 pointed to the choice of magnesium as the logical material to meet all requirements.

### Magnesium Easily Machined

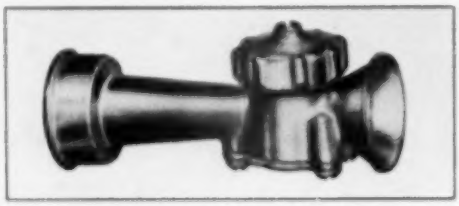
Top and bottom views of the main frame are shown in Figure 3. The turntable center A, recording arm pivot center B and playback arm pivot center C demand precision both in the center-to-center dimensions, and in the size of bearing holes at each center. These dimensions are held to a total tolerance of .0004 operations on a Heald Bore - Matic boring machine equipped with four boring heads.

The method of machining, and the excellent machinability of magnesium result in a very high degree of surface finish on all bored and faced surfaces. Boring and facing are performed on combination tools in one operation. Boring head speeds of 3000 RPM are used,

(Continued on Page 66)

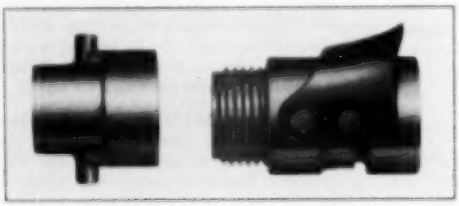

The Latest Developments in

**GARDEN HOSE APPLIANCES of ZAMAK ZINC ALLOYS**



"ELKAY" ROTARY HOSE NOZZLE

Instantly adjustable from a powerful jet to a soft spray mist by finger tip control.



"CLAMP-ON" HOSE COUPLINGS

The piece with the lugs is left on the sill cock or garden valve, the other on the hose. Clamp snaps over and locks; snaps off. No need for screwing on or off of regular hose couplings.

*For over a quarter of a century UNION DIE CASTING CO., LTD. has led in new developments and die castings of the highest quality. We invite inquiries.*

**UNION DIE CASTING CO., Ltd.**

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# NEWS OF THE INDUSTRY

### CLEVELAND HARDWARE APPOINTS AGENTS

Robert C. Kleindinst of Buffalo, N. Y., has been named by the Cleveland Hardware and Forging Co. as its die casting sales representative in New York state. E. S. Hanny of Plainville, Conn., has also been appointed by the company as its representative in the New England area.

The appointment of the two new agents bring the total of the company's representatives to 11. Of this number, seven are in the Middle West, three in the East, and one in the Southwest.

### MADISON-KIPP HONORED FOR 1949 SAFETY RECORD

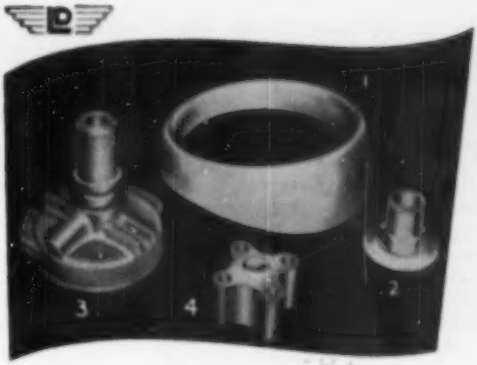
Madison-Kipp Corp. of Madison, Wisconsin, producers of zinc and aluminum die castings, was recently awarded a plaque by the Employers Mutual Insurance Co. for compiling an outstanding safety record during 1949. Victor Gruendler, Kipp safety director, told guests and em-

ployees at a luncheon that the Kipp factory accumulated 442,000 man-hours during 1949 before having a lost-time accident.

The company completed a total of 560,000 man-hours for the year with an accident frequency of 1.8 and a severity of .0018, representing a total of one day lost during the entire year because of an accident in the plant. Accident frequency achieved by the factory is less than one-fifth the normal frequency for the die casting industry, and its severity frequency one-tenth.

### ADVANCE TOOL COMPLETES EXPANSION PROGRAM

A $150,000 expansion program that increased plant capacity by 50 percent and increased floor space to 125,000 square feet was completed recently by the Advance Tool and Die Co. of Milwaukee, Wis., according to Clarence Omann, president of the company. Increased space for

**Aluminum and Magnesium Die Castings**

***—The Designers' Delight!***

**GREATER SCOPE FOR PRACTICAL AND ECONOMICAL PRODUCTION IS OFFERED BY THESE LIGHTWEIGHT METALS**

**Versatile! Yes, versatile is the word that best describes the innumerable channels opened to manufacturers who select light metal die casting. The illustrations shown above include (1) an Aluminum Speedometer Trim Housing, (2) Aluminum Filter Base for small engines, (3) Aluminum Automobile Distributor Base, and (4) a Magnesium Automobile Fan Spacer. To achieve economical production, aluminum was chosen for the first three of these parts. However, the durable and extra lightweight Fan Spacer was more economically and precisely produced through the use of magnesium die casting**

**Die casting with these new light metal alloys offers to manufacturers greater opportunities to lower production costs and the weight of their products. Also, these metals allow more freedom of design and offer greater scope in carrying out the designers' ideas. In addition, these die castings save many man-hours of finishing time.**

**Die Castings of magnesium or aluminum may offer you solutions to many of your cost and production problems.**

**LITEMETAL DICAST, INC. is an organization of specialists—men thoroughly experienced in the casting and machining of magnesium and aluminum alloys—the new metals of structural design.**

**Write today for literature and case histories of Litemetal Dicasting.**

**Quick action on inquiries.**

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A DIVISION OF HAYES INDUSTRIES

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PLANT AND EXECUTIVE OFFICES

die casting lines, offices, shipping, trimming and paint spraying have been made available by the program.

At the same time Mr. Omann announced the merger of Advance with the former L. & W. Tool and Manufacturing Co. of Milwaukee. Mr. Omann continues to hold a major interest, while Frank Werth and Alfred Lemberg, partners in L. & W., become vice-president and directors of the company.

Advance has a staff of 100 workers and reported sales last year in excess of $1,000,000. The company also produces proprietary goods consisting of couplings and pulleys made of zinc for use on light machines. The firm was founded in 1920 by C. R. Reediger, retired.

### DOW TRANSFERS MURPHY TO CHICAGO OFFICE

J. P. Murphy has been transferred from The Dow Chemical Company's Magnesium Technical Service and Development Group to the magnesium sales staff of the company's Chicago, Illinois, sales office, it has been announced by W. S. Loose, magnesium sales manager.

Mr. Murphy was educated at Yale University where he received his Bachelor of Engineering degree in metallurgy in 1942. He joined the staff of the magnesium laboratory of The Dow Chemical Company in 1942 where he was engaged in research on high temperature magnesium alloys. Following this, Mr. Murphy served for 2½ years in the United States Navy. On his return to civilian life, he became a member of the Technical Service and Development group of Dow's Magnesium Division.

### LESTER DIE CASTINGS ACQUIRES FACILITIES

The purchase of two new die casting machines as part of an expansion program at Lester Castings, Inc., of Cleveland, Ohio, was announced recently by Thomas Lester, president. The acquisition of the machines allows the company to produce aluminum and zinc die castings up to 20 pounds in weight.

At the same time Mr. Lester also disclosed that the company had acquired an interest in Caunter Mold Co. to increase its tool and die shop facilities.

Also announced was the construction of a concrete ramp to facilitate handling of freight and loading and unloading of trucks. A new shipping and receiving department has also been installed.

### HOUGHTON EXECUTIVE DIES

The death of L. D. Holland, assistant to the president and a member of the Board of Directors of E. F. Houghton & Co., Philadelphia, occurred recently after a long illness. He was 46, and had been connected with Houghton since 1927 as sales representative, Western Division sales manager, manager of research sales and assistant general sales manager. Educated at Coe College, Iowa, he was married in 1926 and is survived by his widow and two daughters.


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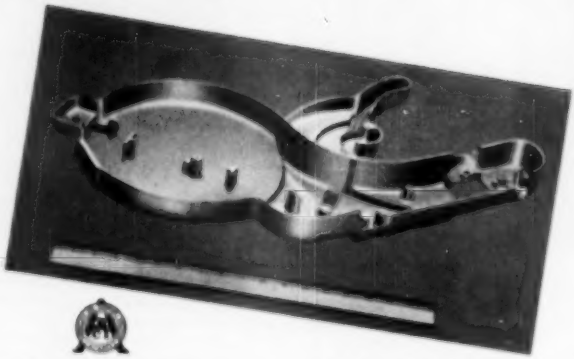
in all Tool-Die Engineering die castings



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### CROMWELL REPRESENTS HILFINGER IN CHICAGO

Frank Cromwell is now head of the Chicago office of the Hilfinger Corp., Toledo firm that manufactures, plates and finishes die castings. Mr. Cromwell, 52, has 31 years back-

Frank Cromwell

ground in the die castings industry and related fields despite his relatively few years. He joined Hilfinger recently after serving for five years as president of Cromwell-Neukom, a selling organization specializing in plated die castings. The Hilfinger office in Chicago is located in the Palmolive Bldg.

Prior to that he spent 20 years in the sales department of Doehler-Jarvis Corp. and 6½ years as executive vice-president in charge of sales for Gerity-Michigan Corp.

### DOEHLER-JARVIS MAKES FILM ON DIE CASTING PROCESS

Doehler - Jarvis Corporation has signed a contract with the Jam Handy Organization calling for the production of a motion picture on the die casting process, it has been announced by H. H. Doehler, Chairman of the Board of Doehler-Jarvis.

The motion picture, tentatively set to include two and one-half reels requiring about 25 minutes for projection, should be ready for distribution by early autumn. Mr. Doehler pointed out that the film was being produced for audiences which would include technical societies, users and prospective users of die castings, product engineers, students, etc.

## OPPORTUNITIES

**REPRESENTATIVE WANTED**

Large producer of zinc and aluminum die castings with complete and modern facilities needs sales representation in the Chicago territory. Address Box 6250, Die Castings Magazine.

**MANUFACTURER'S REPRESENTATIVES WANTED**

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We Like to Look Back 25 and 30 Years

Most men like to reminisce; and we get a particular pleasure out of thinking back to our first years in the die casting business. For it was then that many of our present customers placed their first orders with us. The memory is made even more pleasant by the fact that these business relations have grown year by year and, in many cases, have developed into warm personal friendships.

We look upon this as proof of customer confidence in Badger service and quality. May we suggest that you, too, can benefit from our experience and modern facilities.

DIE CASTING CORP.

### ZINC INSTITUTE ELECTS

Edward H. Snyder was re-elected for a second term as president of the American Zinc Institute at the annual Board of Directors meeting held in St. Louis recently. Mr. Snyder is president of Combined Metals Reduction Co. of Salt Lake City.

The three vice-presidents now holding office were also re-elected: Clarence Glass, Anaconda Sales Co.; George Mixter, U. S. Smelting, Refining & Mining Co.; and Raymond F. Orr, Athletic Mining & Smelting Co. Erle V. Daveler, American Zinc, Lead and Smelting Company, was reelected treasurer and Ernest V. Gent continues as executive vice president and secretary.

### LATROBE ELECTS TWO

Joseph Workman and J. Rufus Larson were recently elected to the Board of Directors of the Latrobe Electric Steel Co., Latrobe, Pa.

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THE "ROOTIN TOOTIN"
GENE AUTRY HORN

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# CURRENT REVIEWS

Book reviews, abstracts of current articles and descriptions of products and processes of special interest to the designers, purchasers and finishers of die castings are included in this department.

## NEW METHOD PERMITS DIE CASTING TWO OR MORE COMPLETELY ASSEMBLED PARTS SIMULTANEOUSLY

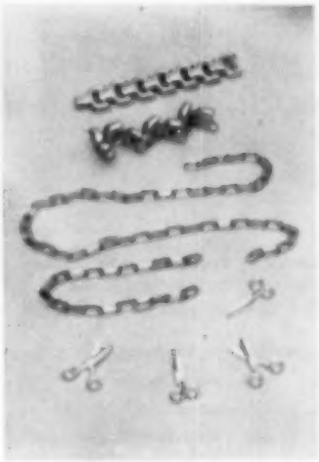
BY MEANS of the Intercasting* process, reported to be a newly developed die casting technique, it has become possible to form two or more separate die cast pieces in such a way that they come from the die completely assembled and trimmed.

In one completely automatic operation, pieces which are hinged, linked or otherwise joined can be produced, and need no subsequent operation before plating or use.

This process can be used to produce individual assemblies such as the miniature scissors shown in the accompanying illustration, or continuous linked or hinged assemblies such as the link chain or pintle chain shown.

The miniature scissors have been made up of two elements which are cast in one primary operation with the blades in proper relationship and hinged to each other by a pivotal rivet-like member which is an integral part of the casting.

The hinged element of the scissors is a very close precise, movable fit. On the other hand, the link chain is illustrative of a very loose interlinked design. The links are solid elements without joints of any kind. The solid links are connected together in a continuous chain,



Three types of parts which are die cast completely assembled are shown above. They are: top, interlinked pintle chain; center, link chain with solid links; and below, small scissors one inch in length.

and can be produced in short lengths or thousands of feet.

The pintle chain, with Y-shaped elements, can likewise be cast continuously or in predetermined lengths. Here, as in the scissors, the hinging elements fit precisely but are freely movable.

Newest use for this process is the die casting of two piece hinged snap rings for loose leaf binders. These rings come from the die completely formed and assembled.

*A process developed and introduced by the Grino Reproducer Corp., 780 East 133rd St., New York 54, N. Y.

## DESIGNING WITH DIE CASTINGS TO CUT COSTS

EDWARD R. RACK.

Electrical Manufacturing, Vol. 45, No. 4, April, 1950, pp. 78-81, 188.

The author tells how the use of die cast parts enabled the Automatic Products Co. to change the design of a heat regulator and manufacture a simplified product that is safer and more efficient. The regulator is used for thermostatic control of draft and damper doors of hand-fired solid-fuel furnaces.

Described is the installation of a fail-safe hydraulic operating system using a die cast piston cylinder, actuating arm and housing.

Listed are the simplifications brought about by the use of these die castings. These include the reduction of the number of component units from five to two, a thermostat and regulator; the decrease in the number of electrical connections from 18 to four; and a neater and more compact appearance.

TWO-CYCLE GASOLINE ENGINE from Power Products Corp., Grafton, Wisconsin.

Aluminum die castings and permanent mold castings have helped in reducing the weight of this vertical drive, one hp gasoline motor to 14 pounds. This engine uses a regular carburetor. *Product Engineering*, March, 1950, pg. 165.

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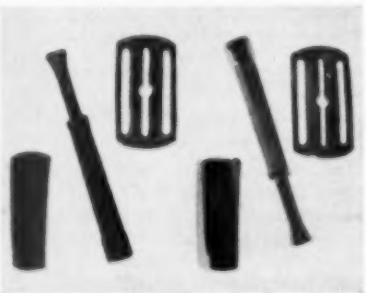

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## SPEAKING OF LIGHT WEIGHT

*(Continued from Page 60)*

with a table feed of approximately 18 per minute. The boring bar for the rear worm shaft hole is equipped with inserted dampers to prevent vibration. A constant flow of oil on the bar keeps it centralized in the hole and helps to maintain accurate alignment of holes in the two gear boxes. Boring tools are made of Grade 999 Carbide, Facing and Chamfer tools of 907 and 883 Carbide. Tools have 10° top rake angle with 2° side rake angle and 10° relief angle.

The turntable center is fitted, after boring, with a hardened and ground steel bushing, finished to eight microns. Maximum clearance between turntable spindle and hole in bushing is .0004. The recording and playback arm centers are fitted with precision ball bearings.

Since the main frame casting serves as a rigid assembly frame for all recording mechanism parts, for all gearing and for supporting the electric motor, it incorporates all the necessary pads, sleeves, bosses and mounting details. The advantages of the die casting process are well known for all applications requiring a variety of mounting detail combined with rigidity; the use of magnesium added lightness to the other factors.

Figure 4 shows the complete main frame assembly, ready for assembly to the electronic chassis. Recording and playback arms are shown at C and D. The optical system housing E consists essentially of two tubular sections at right angles to one another. The vertical section is a close fit in the corresponding sleeve cast integral with the main frame, and within it are mounted the lamp socket and indexing lamp.

The horizontal section of E mounts a system of condenser and projection lenses and a mechanical slit adjusted to .005 opening. The image of this slit

is projected to the translucent indexing scale by two front surface mirrors. Although these two mirrors are mounted co-axially, their rotation is independent, one mirror being fastened directly to the playback arm at its pivot axis, the other mirror driven by gearing from the recorder arm. The position of the recording stylus and the playback stylus is therefore accurately indicated under any condition of use by means of two separate light beams on the indexing scale.

By means of a carefully designed friction mechanism both heads may be positioned to any desired time-marking on the index scale. In general dictation use, the two light beams are usually synchronized, i.e., set for co-incidence on the index scale. If dictation is interrupted at any time, and the dictator desires to listen back to the last few words dictated, he only has to press a button on the microphone to accomplish this. If, however, he desires to listen back further, he has only to move the playback head the desired time interval, as shown on the index-scale.

A companion machine to the recorder is the "Tycoon" transcriber, which is used by the typist, and is equipped with convenience features for this use.

The main housing of the Tycoon transcriber utilizes the same die casting as that used on the recorder, but two segments of metal are removed in a press-operation. (See Figure 2.) An additional group of magnesium die castings, used on the transcriber, but not on the recorder, is shown in Figure 5. It is very desirable to keep the inertia of the transcriber-playback arm to a minimum, and yet maintain rigidity at a maximum. The high stiffness to weight ratio of magnesium made it a natural choice for this application. The playback arm trunnion is shown at "E", Figure 5. A part made from extruded magnesium tubing (not shown) serves to connect the playback head ("C" Figure 5) to the trunnion and its associated parts.


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## PLATED DIE CAST TUBES

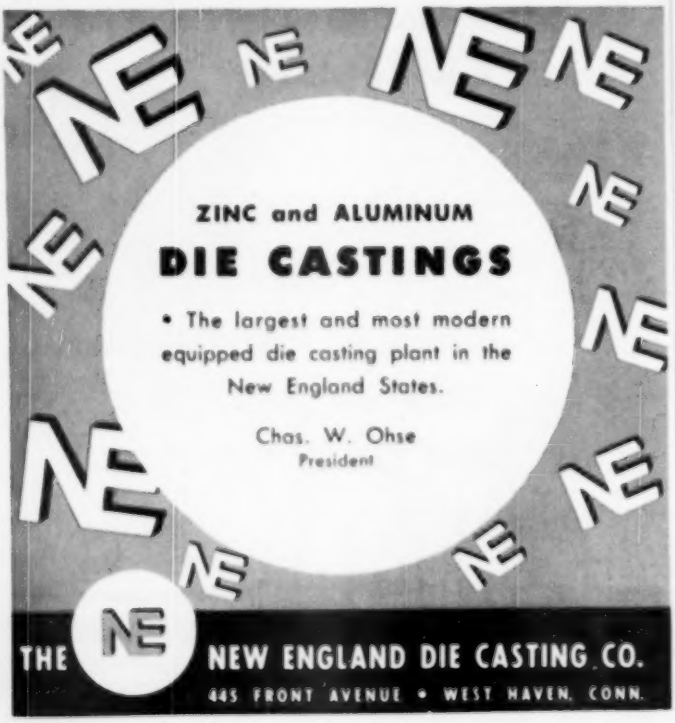
*(Continued from Page 30)*

*color from the rest of the tube. After serving its purpose in preventing shading of the chrome, the web is punched out.*

The bottom part of the tube is cast to size to fit a cored hole in the slide housing.

The base, Figure 3, is a two-piece assembly that has two cast holes in each section, those in the rear section being threaded. After the coin tubes and housing have been fitted into place they are held by screwing the two halves of the base together with a pair of machine screws with chrome plated heads. The base is sprayed with a black wrinkle enamel to eliminate the need for polishing out cold shuts, flow marks and other defects, and is less expensive than the hardware finish originally called for by the manufacturer.

The slide housing, Figure 2, consists of three die cast parts,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the upper and lower portions which are fastened together with Phillips head screws and the sliding portion which fits between them and is activated by a pair of springs. The movement of the slide causes the ejection of coins from the tubes.

#### Keyed for Alignment

The hole in the upper portion of the housing that receives the coin tube is cored to size, including a small groove that fits over a key cast onto the tube end. This is to align the two so that the peep holes in the coin tube will always be facing to the front on the assembled changer.

After flash has been removed from the components of the slide housing, threads are tapped into the cored holes in the upper and lower sections. The coin tube is driven into the upper section with a plastic mallet and the tube is chucked in the lathe.

A tool then spins the lower edge of the tube into a slight


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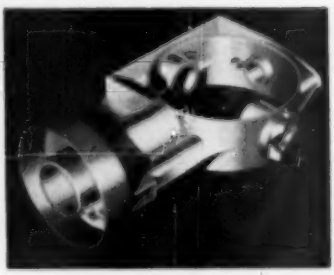
DESIGNING FOR DIE CASTING? — START WITH A HOLE



The design of a die casting starts with a consideration of the required holes and openings. These, in turn, must be surrounded with a minimum of metal consistent with the requirements of appearance, strength and the needs of the die caster for proper draft and tolerance.

Lowest cost can be obtained by designing so as to simplify die construction and promote practical casting and finishing operations. The die cast aluminum Wringer Head at left is a good example.

We will be glad to work closely with you toward the solution of similar problems.

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TWIN CITY DIE CASTINGS COMPANY

Talmage & 33rd Aves., S. E.

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flare that securely locks it into the upper section. This makes

Figure 3. The two-piece unit of die cast zinc pictured above is sprayed with a black wrinkle enamel to eliminate the need for polishing out surface defects and is less expensive than the hardware finish originally called for. A name plate of chrome plated zinc lends further attractiveness to the unit.

use of the ductility of the zinc alloy for an inexpensive assembly. The resulting assembly is plated with the slide and lower housing being plated separately.

The only other work involved in completing the changer is assembling. The slide is inserted into the lower portion of the housing and the two fastened to the upper housing-coin tube assembly with Phillips head screws. In turn all are fastened into the base.

## THE PERFECT SET-UP

*(Continued from Page 11)*

mounting the pressed steel spotting shoes are watched closely. For example, distance between centers of the cored holes in which the spotting shoes pivot is held to within 6.452 ± .005 because the shoes must be depended upon to guide the pins accurately onto the proper spot.

The collars are assembled onto a welded steel frame and, since the mounting holes are cored through the casting, they must be held with reasonable accuracy so that the collars line up in proper relationship with each other. To assist in alignment, a flat is formed at each side of the opening through which the pins are positioned.

The castings are ready to use as received from the vendor and require no secondary operations.

This includes the coring of all holes, including the pivot holes formed by moving cores.

For large machines produced in relatively limited quantities, it is often practical and economical to use die castings where: 1) all or most difficult machining operations can be dispensed with, 2) large numbers of identical components are used in each machine or 3) some complex or unusual shape is needed which would be difficult or impossible by any other method.

The Brunswick-Balke-Collender Co. has made use of an aluminum die casting for an important component in this semi-automatic pinsetter which is designed to speed-up and simplify the setting of bowling pins. In so doing, they have obtained the advantage of the die casting process for economy, ease of production and accuracy of dimensions.

*Herbert Chase, *Handbook on Designing for Quantity Production*, p. 13, McGraw-Hill Book Co., Inc.


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## USEFUL LITERATURE

*(Continued from Page 57)*

**14 STRIPPERS, CLEANERS AND PHOSPHATE COATINGS:**

Paint strippers, cleaners and phosphate coating materials are described in six technical bulletins available from Chemco Products Co. of Chicago.

**15 METAL CLEANING AND FINISHING UNITS:**

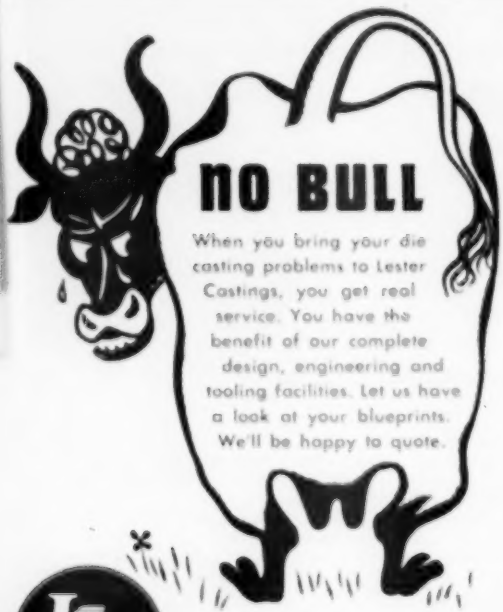
A 24-page illustrated catalog of metal cleaning and finishing machinery is available from the Cincinnati Cleaning and Finishing Machinery Co. Data in the catalog includes a brief discussion of metal cleaning principles plus photographs and description of more than a score of widely varying machine types.

**16 PHOSPHATE COATING SELECTION CHART:**

Twenty-four different means of obtaining phosphate coatings for zinc, aluminum, iron and steel products are listed in tabulated form on a notebook-size chart available from the American Chemical Paint Co. The chart lists typical products treated and methods of application, as well as phosphating bath conditions, pre-cleaning methods, rinses and after treatments.

**17 GRINDER-MILLERS AND MOUNTS:**

The new Precise Super 50 grinder-miller and a complete line of Precise mounts are illustrated and described in an 8-page catalog and a price list available from Precise Products Co.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## LIST OF ADVERTISERS AND THEIR AGENCIES IN THE JUNE ISSUE OF "DIE CASTINGS"

| ADVERTISER | AGENCY | PAGE No. |
|---|---|---|
| Accurate Die Casting Co. | | 61 |
| Aeromark Company | | 68 |
| Advance Pressure Castings, Inc. | | 64 |
| Advance Tool & Die Casting Co. | | 69 |
| Ajax Engineering Corp. | Broomfield-Podmore, Adv. | 60 |
| Allied Research Products, Inc. | Emery Adv. Corp. | 55 |
| Aluminum Company of America | Fuller & Smith & Ross, Inc. | 9 |
| Aluminum Smelting & Refining Co. | | 67 |
| American Zinc & Lead Sales Co. | John Stover Adv. Agency | 12 |
| Anaconda Sales Co. | Ronson & Eckhardt, Inc. | 27 |
| Atlas Powder Co. | Atlas-Kynett Co., Adv. | 67 |
| Badger Die Casting Corp. | W. G. Carney, Adv. | 61 |
| Bellows Co. | Ralph Gross Adv., Inc. | 58 |
| Central Die Casting & Mfg. Co. | | 67 |
| Certified Alloys Company | | 66 |
| Cleveland Hardware & Forging Co. | H. B. Kohorn | 59 |
| H. Cole & Sons, Inc. | | 1 |
| Cowles Chemical Co. | Bayless-Kerr Co. | 53 |
| Daniels Plating Barrel Co. | George Wilfred Wright, Adv. | 54 |
| Detroit Power Screwdriver Co. | Dudgeon, Taylor & Brooks, Inc. | 53 |
| Dollie Corp. | Henry Kopel Creative Adv. Service | 28 |
| Dow Chemical Co. | MacManus, John & Adams, Inc. | 3 |
| Ebrun Die Casting Service | | 66 |
| Federal Die Casting Co. | | 62 |
| Federated Metals Div. American Smelting & Refining Co. | John Mather Lupton, Inc. | 10 |
| Fort Die Casting Co. | Kyan & Speckman | 71 |
| C. M. Gray Mfg. Co. | | 66 |
| Gries Reproducer Corp. | Harold Marshall Adv. Agency | 71 |
| Hilfinger Corp. | | Cover 3 |
| Heli-Coil Corp. | John Mather Lupton, Inc. | 57 |
| Henning Bros. & Smith, Inc. | | 70 |
| The Hoover Co. | Leo Burnett Co., Inc. | 20 |
| R. Lavin & Sons | Marvin L. Isaacson, Adv. | 15 |
| Lester Castings Co. | PDA Advertising Agency | 72 |
| Litemetal Dicast, Inc. | L. J. DuMaine, Adv. | 61 |
| Madison-Kipp Corp. | The Buchen Co. | 11 |
| Milwaukee Die Casting Co. | Paulson-Gerlach & Assoc. | 30 |
| Monarch Aluminum Mfg. Co. | Lang, Fisher & Stashower, Inc. | Cover 2 |
| Mt. Vernon Die Casting Corp. | A. W. Lewis Co. | 15 |
| New England Die Casting Co. | | 68 |
| New Jersey Zinc Co. | | 15 |
| Newton-New Haven Co. | | 6 |
| Nielson Chemical Co. | Dudgeon, Taylor & Brooks, Inc. | 57 |
| Oakite Products, Inc. | Rickard & Co. | 54 |
| Odel Die Casting Corp. | Wallis Adv. Agency | 69 |
| Pangborn Corp. | Vansant, Dugdale & Co., Inc. | 48 |
| Paragon Die Casting Co. | | 31 |
| Parker-Kalon Corp. | Horton-Noyes Co. | 51 |
| Parker White Metal & Machine Co. | Davies & McKinney | 5 |
| Precision Castings Co. | Flack Adv. Agency | Cover 4 |
| Pressure Castings, Inc. | Humphrey, Prentke & Assoc. | 17 |
| Racine Die Casting Co. | | 71 |
| Stewart-Warner Corp. | MacFarland, Aveyard & Co. | 14 |
| St. Joseph Lead Co. | Walter Taragon, Adv. | 10 |
| Schultz Die Casting Co. | | 19 |
| G. W. Smith & Sons, Inc. | Odiorne Adv. Agency | 4 |
| Sonken-Galamba Corp. | Merritt Owens Adv. Agency | 59 |
| Struk Die Moulded Castings Co. | | 64 |
| Superior Die Casting Co. | W. B. Doner & Co. | 8 |
| Thompson Products, Inc. | | 7 |
| Tool & Die Engineering Co. | | 63 |
| Tri-State Die Casting Co. | A. W. Lewis Co. | 66 |
| Twin City Die Casting Co. | Arnold Niemeyer & Assoc. | 70 |
| Union Die Castings Co., Ltd. | | 60 |
| United Chromium, Inc. | Rickard & Co. | 64 |
| Universal Die Casting Co. | | 55 |
| Wagner Bros., Inc. | Fred Bingham, Adv. | 58 |

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